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U.S. Congress. House. Committee on
Government Operations.
Federal foreign research spending and the
dollar drain.



Congress, House, Committee on Government Operations.

FEDERAL FOREIGN RESEARCH SPENDING AND THE DOLLAR DRAIN

HEARINGS BEFORE A SUBCOMMITTEE OF THE COMMITTEE ON GOVERNMENT OPERATIONS HOUSE OF REPRESENTATIVES EIGHTY-NINTH CONGRESS SECOND SESSION

FEBRUARY 10 AND 24, 1966

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FEDERAL FOREIGN RESEARCH SPENDING AND THE DOLLAR DRAIN

THURSDAY, FEBRUARY 10, 1966

HOUSE OF REPRESENTATIVES,
RESEARCH AND TECHNICAL PROGRAMS SUBCOMMITTEE
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C.

The subcommittee met at 10 a.m., in room 2145, Rayburn House Office Building, Hon. Henry S. Reuss (chairman of the subcommittee) presiding.

Present: Representatives Reuss, Rosenthal, St Germain, and Dickinson.

Also present: Mrs. Edna Gass, staff administrator; and John H. Betz, counsel.

Mr. REUSS. Good morning. The Research and Technical Programs Subcommittee of the House Committee on Government Operations will be in order.

I would like the representatives from the executive branch—Dr. English, Mr. Kelly, Dr. Larsen, Dr. Smull, and Dr. Wilson—to come forward and sit at the table, please.

You all have associates with you, gentlemen, and those that can find room at the head table are welcome to do so. Others can hover in the near background.

This subcommittee has the responsibility to review the economy and efficiency of Federal research and development programs. These hearings are to inquire into the efforts of the departments and agencies to reduce the dollar outflow caused by U.S. Government foreign research spending abroad.

As is well known, since at least 1960 there has been a critical situation in our balance of payments. Valiant efforts have been made to bring the payments into balance. Despite these efforts, however, the annual deficit remained on the order of \$3 billion or more a year until this last year, when happily it was reduced to about \$1.3 billion. The payments deficit is still, however, a very serious problem. The Secretary of the Treasury and the President in his Economic Report this year have made very clear that there will be a continuing effort on the part of the Government to bring U.S. payments into balance. Specifically they have set for the current calendar year 1966 a goal of reducing our payments deficit to zero, give or take a quarter of a billion dollars on either side.

President Johnson has recently reinstructed all Government departments and agencies "to spare no effort in reducing the dollar drain of their spending still further." This is similar to several dozen other

directives to the same effect made by at least three Presidents over the last 5 or 6 years.

The Federal Government will spend in fiscal 1966 nearly \$90 million on research and development abroad. The five agencies represented here today—the Atomic Energy Commission, the Department of Health, Education, and Welfare, the Department of Defense, the National Aeronautics and Space Administration, and the National Science Foundation—will spend nearly \$75 million. Of the \$75 million, nearly \$30 million will be spent on grants and contracts to foreign scientists and others for research abroad which add to the dollar drain.

In addition, two agencies, the National Institutes of Health in HEW and the National Science Foundation, will spend nearly \$5 million to educate and train American students abroad, and four agencies, AEC, HEW, DOD, and NSF, will spend some \$3 million on science offices abroad.

Today we will attempt to find out what these departments and agencies have been doing, in accordance with the President's directive, to cut down or eliminate the drain on our dollar resources caused by foreign spending. We note, with dismay, I might say, that the estimated fiscal year 1966 level of obligations resulting in research spending abroad instead of having been reduced since 1962 has instead gone up. In fiscal 1962 it was \$23.7 million, in 1966, today, it is \$28.5 million, or up by about 20 percent. This seems an odd way of responding to the needs of our balance-of-payments situation, and, of course, we will give the agencies an opportunity to justify these continuing and growing expenditures.

The Bureau of the Budget over part of this period has established what are called ceilings on foreign research expenditures. We will want to know whether that word "ceiling" is actually justified in view of the fact that they keep being pierced, in view of the fact that nobody seems to do anything about these breakthroughs, in view of the fact that they do not apply to some of the agencies involved, and in view of the fact that to some agencies where they do apply they apparently apply only to certain developed countries. Also, the ceilings in some cases apparently only apply to grants and not to contracts, even though contracts in foreign research result in a dollar drain just as grants do.

We will also want to inquire into the so-called guidelines issued by the Federal Council of Science and Technology in 1964, which apparently have been honored in the breach by some of the agencies. We will be interested in finding out how that happens and who is checking up on whom.

Let me then start by asking you gentlemen about some of the specific research projects which the U.S. Government has been funding abroad and on which you have furnished us some information. In each case I will ask the representative of the relevant agency about this information and I want him to direct his attention to justifying it in view of the critical balance-of-payments deficit, in view of the fact that as long as we have the deficit it substantially impairs the elbow room and influence of our country abroad; in view of the fact that it makes monetary reform almost impossible because foreigners keep saying, "Until you pull your payments into balance we can't move meaningfully into monetary reform." You should make clear in your justification whether the project could possibly have been performed in the

United States, either by Americans or by foreign scientists invited here, the project's value to us, and its urgency—whether it could not have been postponed until our balance of payments was in better order.

STATEMENT OF JAMES F. KELLY, COMPTROLLER, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

(The prepared statement of Mr. Kelly is as follows:)

PREPARED STATEMENT OF JAMES F. KELLY, COMPTROLLER, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

I am pleased to appear before your committee in response to your invitation of January 21 to discuss the activities of the Department of Health, Education, and Welfare as they affect the balance of payments with particular emphasis on the field of international research and training. Dr. James A. Shannon, Director of the National Institutes of Health, is here and will provide the committee with an overview of our research and training activities and the importance of these international activities to the total domestic programs.

I would like to summarize briefly the total involvement of the Department in foreign activities and to outline the steps we have taken to minimize the impact of our programs on the balance-of-payments deficit. During fiscal year 1966 the operating agencies of the Department expect to make a net expenditure of \$162.7 million in payments abroad affecting the balance of payments. Of this total, about \$149.1 million, almost 92 percent, will be for social security benefits. These payments represent an entitlement under the law and we have no real administrative control over the amounts required. Of the remaining \$13.6 million, about \$10.8 million will be applied to research, \$2.6 million to training, and about \$200,000 to direct operations.

We have taken very seriously our obligation to take every possible action to limit the impact of our programs on the flow of dollars to foreign countries. We have pursued a vigorous policy of taking prompt action to improve the balance-of-payments situation with respect to all of our programs involving international exchange. Included in the actions taken were these specific steps:

1. The NIH initiated a policy of limiting its foreign research grant funds to 4 percent of its total grant awards in 1962 and 1963. This percentage limitation was superseded by more restrictive dollar limitations in 1964, 1965, and 1966.

2. Indirect costs of research were eliminated from consideration for PHS financial support in fiscal year 1962. This policy is now applied to competing renewals and supplementals, as well as new grants.

3. More restrictive criteria were applied to the approval of foreign applications for medical research grants, requiring that such projects have a better than average priority rating and moral commitments for support are limited to 3 years.

4. We have established restrictive limitations on the purchase abroad of equipment required in research projects.

5. We have adopted a policy of making quarterly rather than annual payments on research grants to minimize cash balances in the hands of the grantees.

6. We have imposed restrictions on the use of funds for foreign travel for both grantees and for our own staff traveling abroad. Foreign grantees must have specific approval for travel in foreign countries and we have established restrictive dollar ceilings applicable to all Department personnel on the amounts available for international travel.

7. We have encouraged local financial participation and have strengthened our evaluation of research proposals.

8. We have made extensive efforts to make use of "excess" and "near-excess" foreign currencies for all programs including the payment of social security benefits in foreign countries and for other payments as well as research.

9. We are phasing out the research laboratory in Accra, Ghana and have reduced the staff to six employees, about one-fourth of its previous strength.

Through actions such as these we have restrained the outflow of dollars in the research and training areas with what we hope is minimum impairment to the objectives of the programs.

During the 5-year period, fiscal years 1962 through 1966, our total obligations for research abroad by foreign scientists has increased as our total research effort has increased. Obligations for foreign research have risen from just under \$19

million in 1962 to about \$25.6 million estimated for 1966. This increase has not, however, meant an equal rise in dollar outflow. During the same period obligations using excess foreign currencies and the purchase of equipment in the United States have increased from \$9.1 million in 1962 to \$15.3 million in 1966. Thus, 1966 net obligations affecting the balance of payments will be only about \$400,000 higher than in 1962. In fact, during the past 3 years there has been a decline of over \$200,000 in research obligations affecting the expenditure of dollars abroad.

In the same period, obligations for training abroad have increased by about the same amount—from \$2.6 million in 1962 to \$3.0 million in 1966.

These restraining actions were taken in recognition of our obligations to minimize the adverse effects of our international activities on the U.S. balance of payments. At the same time we must be cognizant of the essential role of foreign medical research in the advancement of the health sciences in the United States. The steps we have taken were carefully considered and were designed to carry out our obligations under both of these concepts.

I would like to emphasize that research conducted in foreign countries by foreign scientists has as its purpose the attainment of advantages in the field of research not otherwise available to this country. It does not have as its purpose, the attainment of other advantages such as a more favorable image, the financial assistance of other countries or the improvement of research capabilities in foreign countries. Although all of these advantages do accrue to some extent, they are ancillary benefits resulting solely from the pursuit of domestic objectives.

The determination of the appropriate dollar level of research in foreign countries, as in all research, is extremely difficult. From the long-range standpoint, the basic consideration should be the needs of the United States for knowledge attainable only by foreign research. The actual investment in dollars in any particular year should be sufficiently flexible to make due allowance for such factors as the problems of the balance of payments, the number of excellence of the projects under consideration and the exploitation of possible breakthroughs in specific areas.

We believe our current level of foreign research and training provides an appropriate balance among these sometimes conflicting considerations and that we should continue our support at an annual level in this range.

Dr. Shannon and I will be pleased to provide any additional information the committee may require.

STATEMENT IN RESPONSE TO QUESTIONS RAISED BY SUBCOMMITTEE LETTER DATED JANUARY 21, 1966

Question 1. What have been and are estimated to be the amounts of obligations for research abroad by foreign scientists in such programs for the years 1962 through 1966? Please give the annual total amounts of such support and the amounts less Public Law 480 support.

Answer. Total obligations for the Department for research abroad are as follows:

[In thousands of dollars]

Fiscal year	Total obligations	Obligations for U.S.-purchased equipment	Amount of excess foreign currencies used ¹	Net foreign obligations (col. 1 less cols. 2 and 3)
1962-----	18,934	2,760	6,362	9,812
1963-----	20,733	3,090	6,373	11,270
1964-----	24,594	2,500	10,608	11,486
1965-----	20,405	1,400	8,684	10,321
1966-----	25,611	1,140	14,204	10,267

¹ Excess foreign currencies are derived primarily through Public Law 480. The amounts shown, however, include both Public Law 480 currencies and other "excess" foreign currencies.

Question 2. What are the amounts of such support which have been and are estimated to be given to foreign scientists in the developed countries (the countries of the OECD, Australia, New Zealand, and South Africa)?

Answer. Total obligations in these areas are as follows :

[In thousands]

Fiscal year	Total obligations	Obligations for U.S.-purchased equipment	Amount of excess currencies used	Net obligations in dollars
1962-----	\$8,024	\$1,450	\$175	\$6,399
1963-----	8,849	1,440	71	7,338
1964-----	8,459	1,110	39	7,310
1965-----	6,557	680	281	5,596
1966-----	6,520	530	260	5,730

Question 3. Under what specific statutory authority are such grants made? Please quote from the statute.

Answer. Authority for the making of grants and contracts for research abroad by foreign scientists exists in several statutes :

(a) The International Health Research Act of 1960 (Public Law 86-610) provides in pertinent part (22 U.S.C. 2102a) :

"To carry out the purposes of clause (1) of section 2101 of this title, the Secretary of Health, Education, and Welfare * * * may in the exercise of his responsibilities under the Vocational Rehabilitation Act, sections 191-194 of title 42, and any other provision of law, to conduct and support health research and research training, including research and research training relating to the rehabilitation of the handicapped, make such use of health research and research training resources in participating foreign countries as he may deem necessary and desirable."

(b) Sections 301 and 308 of the Public Health Service Act (42 U.S.C. 241 and 242f) provide :

SEC. 301. The Surgeon General shall conduct in the Service, and encourage, cooperate with, and render assistance to other appropriate public authorities, scientific institutions, and scientists in the conduct of, and promote the coordination of, research, investigations, experiments, demonstrations, and studies relating to the causes, diagnosis, treatment, control, and prevention of physical and mental diseases and impairments of man, including water purification, sewage treatment, and pollution of lakes and streams. In carrying out the foregoing the Surgeon General is authorized to—

(a) Collect and make available through publications and other appropriate means, information as to, and the practical application of, such research and other activities;

(b) Make available research facilities of the Service to appropriate public authorities, and to health officials and scientists engaged in special study;

(c) Establish and maintain research fellowships in the Service with such stipends and allowances, including traveling and subsistence expenses, as he may deem necessary to procure the assistance of the most brilliant and promising research fellows from the United States and abroad;

(d) Make grants-in-aid to universities, hospitals, laboratories, and other public or private institutions, and to individuals for such research or research training projects as are recommended by the National Advisory Health Council, or, with respect to cancer, recommended by the National Advisory Cancer Council, or, with respect to mental health, recommended by the National Advisory Mental Health Council, or with respect to heart diseases, recommended by the National Advisory Heart Council, or, with respect to dental diseases and conditions, recommended by the National Advisory Dental Research Council, and include in the grants for any such project grants of penicillin and other antibiotic compounds for use in such project; and make, upon recommendation of the National Advisory Health Council, grants-in-aid to public or nonprofit universities, hospitals, laboratories, and other institutions for the general support of their research and research training programs: Provided, That such uniform percentage, not to exceed 15 per centum, as the Surgeon General may determine, of the amounts provided for grants for research or research training projects for any fiscal year through the appropriations for the National Institutes of Health may be transferred from such appropriations to a separate account to be available

for such research and research training program grants-in-aid for such fiscal year;

(e) Secure from time to time and for such periods as he deems advisable, the assistance and advice of experts, scholars, and consultants from the United States or abroad;

(f) For purposes of study, admit and treat at institutions, hospitals, and stations of the Service, persons not otherwise eligible for such treatment;

(g) Make available, to health officials, scientists, and appropriate public and other nonprofit institutions and organizations, technical advice and assistance on the application of statistical methods of experiments, studies, and surveys in health and medical fields; and

(h) Adopt, upon recommendation of the National Advisory Health Council, or, with respect to cancer, upon recommendation of the National Advisory Cancer Council, or with respect to mental health, upon recommendation of the National Advisory Mental Health Council, or, with respect to heart diseases, upon recommendation of the National Advisory Heart Council, or, with respect to dental diseases and conditions, upon recommendations of the National Advisory Dental Research Council, such additional means as he deems necessary or appropriate to carry out the purposes of this section.

Sec. 308. (a) To carry out the purposes of clause (1) of section 2 of the International Health Research Act of 1960, the Surgeon General may, in the exercise of his authority under this Act and other provisions of law to conduct and support health research and research training, make such use of health research and research training resources in participating foreign countries as he may deem necessary and desirable.

(b) In carrying out his responsibilities under this section the Surgeon General may—

(1) establish and maintain fellowships in the United States and in participating foreign countries;

(2) make grants to public institutions or agencies and to nonprofit private institutions or agencies in the United States and in participating foreign countries for the purpose of establishing and maintaining fellowships;

(3) make grants or loans of equipment, medical, biological, physical, or chemical substances or other materials, for use by public institutions or agencies, or nonprofit private institutions or agencies, or by individuals, in participating foreign countries;

(4) participate and otherwise cooperate in any international health research or research training meetings, conferences, or other activities;

(5) facilitate the interchange between the United States and participating foreign countries, and among participating foreign countries, of research scientists and experts who are engaged in experiments and programs of research or research training, and in carrying out such purpose may pay per diem compensation, subsistence, and travel for such scientists and experts when away from their places of residence at rates not to exceed those provided in section 5 of the Administrative Expenses Act of 1946 (5 U.S.C. 73b-2) for persons in the Government service employed intermittently; and

(6) Procure, in accordance with the provisions of section 15 of the Administrative Expenses Act of 1946 (5 U.S.C. 55a), the temporary or intermittent services of experts or consultants; individuals so employed shall receive compensation at a rate to be fixed by the Secretary, but not in excess of \$50 per diem, including travel time, and while away from their homes or regular places of business may be allowed travel expenses including per diem in lieu of subsistence, as authorized by section 5 of the Administrative Expenses Act of 1946 (5 U.S.C. 73b-2) for persons in the Government service employed intermittently.

(c) The Surgeon General may not, in the exercise of his authority under this section, assist in the construction of buildings for research or research training in any foreign country.

(d) For the purposes of this section—

(1) The term "health research" shall include, but not be limited to, research, investigations, and studies relating to causes and methods of prevention of accidents, including but not limited to highway and aviation accidents.

(2) The term "participating foreign countries" means those foreign countries which cooperate with the United States in carrying out the purposes of this section.

(c) Appropriations for the Department of Health, Education, and Welfare for the years 1962-66 have contained specific authorization for the purchase of excess foreign currency by several agencies of the Department to carry out activities authorized by section 104(k) of Public Law 480. The public law citations of the appropriation acts and the agencies affected, by fiscal year, are as follows:

- 1962, Public Law 87-290, Vocational Rehabilitation Administration, Public Health Service, Welfare Administration (then part of Social Security Administration).
- 1963, Public Law 87-582, Office of Education, Vocational Rehabilitation Administration, Public Health Service.
- 1964, Public Law 88-136, Office of Education, Vocational Rehabilitation Administration, Public Health Service.
- 1965, Public Law 88-605, Office of Education, Vocational Rehabilitation Administration, Public Health Service.
- 1966, Public Law 88-156, Office of Education, Vocational Rehabilitation Administration, Public Health Service, Welfare Administration.

Question 4. Has the attention of the Congress been called to the existence of these foreign grants? If so, when and in what context? Please give specific citations. Do such amounts appear separately in the budget submissions to Congress?

Answer. The attention of Congress has been called to the existence of these foreign grant programs of the Department. For the past 3 years the Public Health Service has submitted a special statement to the House Appropriations Committee providing detailed information concerning all international activities of the Public Health Service. These statements have been printed in the committee hearings. (Department of Labor and Health, Education, and Welfare, 1964, pt. 2, pp. 689-693; 1965, pt. 2, pp. 645-650; 1966, pt. 2, pp. 63-69.)

Each of the four agencies receiving appropriations for the purchase of excess foreign currency, Office of Education, Vocational Rehabilitation Administration, Public Health Service, and Welfare Administration has submitted a special justification for its program and separate appropriation language for these funds has been acted upon by the Congress.

With the exception of these appropriations, the amount programed for foreign research grants is not set forth separately in the budget estimates. During the course of the hearings, however, there is a discussion of the planned foreign research programs. (See House hearings 1964, pt. 3, pp. 211-212; 1965, pt. 3, pp. 142-144; 1966, pt. 3, pp. 185-189, and Senate hearings 1965, pt. 1, pp. 1223-1224; 1966, pt. 1, pp. 925-955.)

In both 1965 and 1966 the House Appropriations Committee took specific notice of international research activities of the NIH in its report on appropriation bills expressing concern that limitations on the level of such research because of international fiscal considerations would impair progress toward the prevention and cure of the dread diseases. (1965, H. Rept. No. 1316, 88th Cong., pp. 24-25; 1966, House Rept. No. 272, 89th Cong., p. 32.)

Question 5. What restrictions or policy instructions on the permissible amounts of such grants or contracts have you received? Please cite specifically and indicate how and when they were put into effect.

Answer. Bureau of the Budget Bulletin 63-1 issued August 1, 1962, set forth policies and procedures for reviewing and controlling international transactions. This bulletin required that each agency head take all possible steps to minimize payments affecting the balance of payments including the review of activities abroad with a view toward termination, consolidation, or restriction in scope. It further provided that each agency head would establish a system of estimates, reports, and controls as part of the management system. The bulletin prescribed a system of reports to the Budget Bureau on international payments and for the establishment of "targets" or ceilings on such payments.

This Bulletin was superseded by Budget Bureau Circular A-58 issued February 23, 1963, revised December 9, 1963, and again revised July 7, 1964. Immediately upon receipt of the Budget Bureau bulletin instructions were transmitted to the operating agencies of the Department conducting activities involving foreign transactions requesting a critical review of all such activities with a view toward minimizing the effect on dollar outflow. Since that time all foreign research activities, as well as other activities involving dollar payments abroad, have been subjected to the most careful and critical review by agency and Bureau

heads, by the Budget Review Committee of the Department and by the Bureau of the Budget. Some of the results of these reviews and other actions taken to reduce dollar outflow are set forth below in response to question 6.

Question 6. Have any additional restrictions been put on these grants by your Department or agency? Please cite specifically.

Answer. In order to be responsive to the need to reduce the foreign payments deficit, the Department took a number of steps to restrict international dollar payments:

(a) A ceiling of 4 percent of total research grant funds was placed by the National Institutes of Health on the amount of research project grant funds for award to foreign countries in fiscal years 1962-63. This established dollar limitations of approximately \$13,200,000 in 1962 and \$16,100,000 in 1963. Ceilings were applied to all PHS grants in 1964, 1965, and 1966 with dollar limits of \$15 million, \$10,800,000 and \$9,500,000, respectively. Separate ceilings were established on medical research grants in Western Europe, Canada, Australia, and New Zealand but have since been discontinued.

(b) Indirect costs of research were eliminated from consideration for financial support in fiscal year 1962. This policy was subsequently extended to competing renewal and supplemental grants as well as to new grants.

(c) More restrictive criteria were applied to the approval of foreign applications for medical research grants. Under these criteria, foreign research projects must rate better than the average priority score for all applications recommended for approval, including domestic applications.

(d) The Department has placed in effect restrictive limitations on the purchase abroad of equipment required in research projects. In summary, these restrictions require that any equipment item costing \$2,000 or more must be procured through United States sources unless it can be demonstrated that—

(1) The cost of the equipment in the United States is at least 50 percent greater than comparable equipment of foreign origin;

(2) The U.S. equipment does not have the ability to perform with the required precision;

(3) There is a delivery leadtime of 6 months or more;

(4) U.S. equipment is incompatible with existing equipment; or

(5) The use of U.S. equipment is not feasible because of the absence of service facilities and difficulty in obtaining replacement parts.

(e) A policy was adopted beginning with fiscal year 1964 to make quarterly rather than annual payments on research grants in order to retard the outflow of dollars and to minimize cash balances in the hands of grantee institutions.

(f) A ruling was announced that all domestic and foreign grantees must obtain specific NIH approval for any foreign travel financed with grant funds except when such travel had been approved as part of the research plan and budget of the grant application.

Question 7. What additional measures could be taken by your Department or agency to reduce the amounts of these grants or contracts?

Answer. Virtually all of the research conducted by foreign scientists with research funds of the Department is in the field of medical research. It is the view of the Department that obligations for international research grants and contracts have already been reduced to the minimum consistent with the research responsibilities imposed upon us.

The involvement of U.S. citizens as civilians, or as members of the military, outside the United States is so extensive and continuing that a modest investment in research on the diseases to which they are exposed is warranted as an insurance policy. For example, every U.S. physician has patients who are going overseas and to whom he must give cholera vaccine. Consequently, the physician and U.S. medicine in general must have a biomedical effort in cholera and its vaccine even though the disease itself occurs only in certain parts of the world.

Another aspect of research dictating the need for foreign research relates to the uniqueness of resources and opportunities. There are scattered throughout the world unique population groups with unusual genetic composition and with unusual and unexplained variations in the incidence of disease. There are unique cultural traits, such as diet, which influence health and disease and provide unique and often disappearing opportunity for study and shedding important new light on cancer, heart disease, and many other conditions directly related to American health problems.

In addition, there are unusual or highly specialized research complexes in various parts of the world not paralleled in our country. For example, the huge electron microscope in Marseilles, the diversity and competence of the immunochemists at the Pasteur Institute in Paris, the germ-free laboratory in Stockholm and the high-altitude research laboratories in the mountains of Peru all represent remarkable opportunities for the conduct of medical research and for the expansion and diversification of our own research capabilities.

In summary, our own self-interest requires continued participation in international research activities, we have taken a number of steps to reduce the level of research to the bare minimum and the volume is now at a point that it has only negligible impact on the outflow of gold.

Mr. REUSS. Let me first ask Mr. Kelly, Comptroller of the Department of Health, Education, and Welfare, about a number of studies.

Here is Project MH 06286-03 of November 1964. This was an \$11,050 grant to a social scientist in Canada at the University of Montreal to write a book on the "History of Dynamic Psychiatry."

How do you justify this drain on our balance of payments?

Mr. KELLY. Could you give me the number again?

Mr. REUSS. Yes. No. MH 06286-03.

Mr. KELLY. Mr. Chairman, the Secretary asked if I would come this morning and talk with you about the steps that we have taken in order to bring our activities affecting the balance of payments to a minimum. I am accompanied by Dr. Shannon, Director of the National Institutes of Health, who I think is in a much better position to tell you about a specific project.

Mr. REUSS. Let me say to all our witnesses this morning that if you have with you someone who is better able to answer a specific question than you, don't hesitate to have him answer.

STATEMENT OF DR. JAMES A. SHANNON, DIRECTOR, NATIONAL INSTITUTES OF HEALTH, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

(The prepared statement of Dr. Shannon is as follows:)

STATEMENT OF DR. JAMES A. SHANNON, DIRECTOR, NATIONAL INSTITUTES OF HEALTH, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

NIH INTERNATIONAL RESEARCH SUPPORT

The National Institutes of Health, through the Surgeon General of the Public Health Service, derives its legislative authority to participate in international activities from section 308 of Public Law 86-610, the International Health Research Act of 1960. Under the provisions of this legislation, the Surgeon General may engage in international cooperation "to advance the status of the health sciences in the United States and thereby the health of the American people through cooperative endeavors with other countries in health research and research training." In order to carry out its prescribed mission, NIH has used this authority to engage the unusual talents of some of the most outstanding scientists throughout the world on health-related projects of importance to the American people.

Testimony to this talent may be seen from the highly competitive selection process which we use. The procedure enables the best qualified American scientists in a given field to judge the scientific merit of one application against another. Proposals passing the first screen are again judged by a second group of competent outstanding American advisers in terms of whether the work is likely to advance American medical knowledge of an important and priority nature. By the time the judgment is made in favor of an applicant from outside the United States, we may be assured that the applicant is the most competent person to carry on the research in that scientific area. The recipients of

support, because of their exceptional qualifications, are affiliated with outstanding centers of excellence throughout the world.

It may be appropriate at this point to examine the reasons why these American scientific advisers to the Public Health Service recommend the support of scientists in other countries.

Perhaps the most important reason is a recognition by the American scientific community of the interrelationship and interdependence between scientists at work in different countries.

A second important reason is a recognition of the unusual capabilities of the individual investigators. This uniqueness may involve personal talent or specialized education, training, or laboratory work which produces men of high scientific stature. It is through these men and their centers of scientific excellence that great achievements and advancement in science have been made abroad. Unusual or unique research complexes exist in certain countries. One such example is a laboratory of physical chemists and engineers in Holland capable of tackling certain biological aspects of the arteriosclerosis problem by using methods of the physical scientist. Other examples of unique capabilities include the huge electron microscope in Marseilles; a large and diverse group of immunochemists at the Pasteur Institute in Paris; a germ-free laboratory in Sweden; and a high-altitude research laboratory in Peru. All represent remarkable opportunities for the conduct of research—and training of American scientists—by the best minds in research, thus adding to our own fund of knowledge and experience.

A third reason for supporting research abroad is the frequent availability of unique population groups, with unusual genetic composition or variations in the incidence of disease. Studies performed in other countries have often shed important new light on cancer, heart disease, and other health problems of the American people.

A fourth reason is the necessity for conducting research on diseases which, though not found in the United States, are a continual threat to this country. The hazard grows as our personal interchange with other nations increases. Particularly, there exists a problem in the developing countries with which we have continual contact, but which lack the financial and other resources to do such research and yet possess the ecology in which the disease can be studied. Examples of this are schistosomiasis, which occurs even in Puerto Rico, and typhoid fever, a disease sometimes acquired overseas which must be treated in hospitals in this country. American physicians must also be required to protect our citizens going abroad with vaccines against such diseases as cholera and smallpox prevalent primarily abroad. Practical field tests of vaccines against these threatening diseases can only be conducted abroad where the incidence is great enough to give significant data. Often the research can best be conducted by a binational team with an institutional base in the United States. Studies on a trachoma vaccine by Dr. J. C. Snyder of Harvard in Arabia and Dr. J. Thomas Grayston of the University of Washington in Taiwan are examples of this cooperative research, as are the studies by Dr. C. Henry Kempe of the University of Colorado on smallpox in Madras. One ordinarily thinks of trachoma as a blinding disease indigenous to Egypt and parts east. Actually, it is of serious concern to this country, being the most important threat to eyesight among our Indian population in the Southwest.

It should also be noted that awards to investigators abroad are used not only for research on diseases common in the United States, such as cancer, heart disease, etc., but also for research on diseases threatening this country and likely to be encountered by our military forces in South Vietnam, such as cholera, malaria, trachoma, dengue, smallpox, typhoid, leprosy, dysentery, schistosomiasis, and intestinal parasites.

Other reasons for the support of research abroad which are related to the NIH mission should be mentioned. These include the effect it has on augmenting our domestic manpower pool of scientists, the benefits of associating with outstanding scientific leaders abroad in other countries, and the promotion of American medical research techniques and methodology among peoples who can benefit from their use.

The Public Health Service started to support research in other countries in 1947 with five grants involving a total of \$130,000. During the 1950's and early 1960's this support increased to a high point of \$15.5 million in fiscal year 1963. In 1960, when an appreciable increase in the number of foreign grants was noted, NIH began to review carefully the support being given to foreign investigators.

An Office of International Research was established. Among its other functions, this Office examines the existing policies for supporting research in other countries, makes recommendations for administering such support in a reasonable manner, and maintains a continuing review of all Public Health Service research activities abroad. In addition, a small number of NIH scientific specialists were assigned in 1960 to our embassies abroad to assist in this review and to carry out a number of other important functions. Thus, the planned and systematic monitoring of international research activities began well before the ceilings on overseas grants were imposed by the Bureau of the Budget on May 29, 1963.

In 1960, in the interest of prudent administration of funds and without direction from outside, NIH began the development of policies and procedures designed to accomplish this purpose. Consequently, NIH was in a good position to participate in discussion with the Bureau of the Budget, the Office of Science and Technology, and the International Committee of the Federal Council of Science and Technology on how the essential integrity of the overseas operation could be maintained with minor impact on the substantive benefits of the domestic program. Policies evolved have been enumerated by Mr. Kelly.

During fiscal year 1965, the Public Health Service, including the National Institutes of Health, supported 833 research projects in 45 countries. Of the total amount of \$12,170,000 awarded, approximately \$1,400,000 is estimated to have been paid to American equipment manufacturers and \$1,312,000 to have been financed by excess U.S.-owned foreign currency. This means that approximately \$9,458,000 in U.S. dollars has in fact been expended abroad for urgent domestic reasons—a very small part (about three-quarters of 1 percent) of the U.S. dollar deficit. I should also like to point out that the \$12,170,000 in awards for fiscal year 1965 represents a 16.4-percent decrease from the previous year's total award figure of \$14,551,000, and a 21.4-percent drop from the comparable figure for 1963.

So, Mr. Chairman, I hope this brief review will demonstrate quite clearly that the policies governing PHS-NIH research abroad have been carefully planned to provide maximum program results with minimum dollar outflow. Working closely with responsible administration groups, we have been quite conscious of the problems involved, have given them careful thought, and have taken constructive action. Finally, I would emphasize that support of research outside the United States is performed for the immediate benefit of our domestic programs as established by the basic statutes under which we operate, and has had the strong support of the appropriation committees of the Congress, who have maintained a continuing and quite specific audit on these activities.

Mr. REUSS. Dr. Shannon, why couldn't an American social scientist have written this book on dynamic psychiatry and why couldn't it have been delayed until we went through our critical balance-of-payments period?

Dr. SHANNON. I would like to make a general answer and then be quite specific in relation to this grant. If you take a specific research project out of context to its bearing on a total field at a given point in time, it is quite difficult to justify the essentiality of any projects, whether domestic or international. On the other hand, if you take the inputs that are essential for projects in science, then it is our belief in operating under our statutes, and on the advice of quite critical advisory groups and councils, and with the support of our Appropriations Committees, that we must seek out excellence at pertinent periods of time in the development of science. Whether that excellence exists in this country or overseas, it has a role to play in the development of science at that point in time.

Now, Dr. Ellenberger, at the University of Montreal, was encouraged to submit a draft relative to the development of information on the origin and sources of modern dynamic psychiatry because he was considered by the study section and by the council to be most expert in this field.

Mr. REUSS. Wasn't there anybody in the United States that could have written a history of dynamic psychiatry?

Dr. SHANNON. I am sure there were, sir, but this man was considered the best man to do the job by the technically oriented people.

Mr. REUSS. Were there not qualified people in the United States who could have written such a history?

Dr. SHANNON. There were—there are qualified people but this man, who happens to be an American scientist in residence at the University of Montreal, was judged to be the best man to assess what was considered to be a critical area of psychiatry at a critical point in time. I can only say in line with assessing the relative merits that we use the best scientific advisory groups that are available or can be brought together. We are largely guided by the advice that they give us, unless their advice is contrary to the advice we get from our own scientists within our own operation or would result in an action that is contrary to well-understood guidelines for performing this function outside the United States.

Now, I would be very glad to read for you a very brief summary of the activity or I will be glad to furnish for the record—

Mr. REUSS. No, I just would like to have you justify some of the cases in your files. On this Canadian social scientist writing a book on the history of dynamic psychiatry, I gather from your testimony that there were plenty of competent people in the United States to do this but—

Dr. SHANNON. I did not say that, sir.

Mr. REUSS (continuing). For some reason you thought this Canadian was a little better.

Dr. SHANNON. I did not say there were plenty of competent people in the United States who could do this. I said there were other people who could write such a book if they were so asked. It was the judgment of the scientists who assessed the situation that this man was in the best position to provide authoritative work on this subject at this point in time.

Mr. REUSS. Why didn't somebody ask the Americans? In view of our balance-of-payments deficit, in view of the fact that we haven't been able to do the things we need to do in the world today because of our payments deficit—

Dr. SHANNON. I am sorry. All I can do is to fall back on what I have already said. This man was considered by the experts who advised us to be the best man to do this particular work at this particular time. We are not interested in supporting scientists, whether in this country or elsewhere, who are second or third or fourth best. We feel that a book of this sort which is essential for an assessment of dynamic psychiatry will be used extensively, in this country as well as abroad, and that it would be remiss of us to try to have a comparable work developed simply because anybody could provide some such work.

Again I will say that on the technical advice we have—this man was quite superior, and peculiarly able to write this by virtue of his experience.

Mr. REUSS. And you didn't feel it could be postponed for a year or two until our balance of payments was rectified?

Dr. SHANNON. No, sir. I would point out that this book which will affect a large area of science was negotiated in 1962 in amounts of \$5,350 for the first year and \$2,850 for 2 subsequent years. I would point out that when one commissions a monograph in general, that funds are substantially greater than this, and indeed, this did not pay for this man's time but, rather, provided him with the ancillary secretarial help and the like. It permitted him to use his own time to provide the work.

Mr. DICKINSON. Mr. Chairman—

Mr. REUSS. Mr. Dickinson.

Mr. DICKINSON. Dr. Shannon, I think possibly it would be of benefit to me and possibly to the record, too, if you would explain what groups make the selection or recommendation to you. You mentioned the fact that the experts with whom you consulted recommended this person. How is this done? Do you have a panel or who is it?

Dr. SHANNON. Yes, sir. We have two levels of technical review of all of our research grants. The first is at the so-called study section level. The study sections are groups of non-Federal scientists particularly well versed in various segments of the science, who meet roughly three times a year for 2 or 3 days to assess the merits of all research applications that come to the NIH, that fall within their specific field of competence.

Mr. DICKINSON. Right there, tell me what their relationship to NIH is, this group you are talking about now. Are they employees? Are they volunteers? This group you are talking about now.

Dr. SHANNON. They are formally appointed consultants to the Surgeon General, appointed for 4-year terms on a rotating basis to a study section which is a review committee.

Mr. DICKINSON. And this is a group of civilians that serve voluntarily, or are they employees of the Federal Government?

Dr. SHANNON. They are non-Federal scientists drawn from the university world.

Mr. DICKINSON. I see. So they are actually volunteers and serve in this capacity by donating—

Dr. SHANNON. Yes, sir.

Mr. DICKINSON (continuing). Their time.

Dr. SHANNON. They are paid, I think it is \$50 a day, consultant fee partially to cover the time that they give us.

Mr. DICKINSON. And they are appointed by the Surgeon General?

Dr. SHANNON. They are, sir.

Mr. DICKINSON. Thank you. And the other group you referred to—

Dr. SHANNON. The other group, the second group, are the National Advisory Councils. In this case the National Advisory Council on Mental Health which is a statutory body developed or appointed pursuant to the act that established that Institute. It is composed of some 14 members, no less than 7 of which must be non-Federal consultants drawn from lay groups who have a sophisticated understanding of the interplay of science and society.

Mr. DICKINSON. Doctor, I didn't understand that last. The lay group. Will you explain that again?

Dr. SHANNON. Well, there is a group of 14, 7 of which must be technically oriented, 7 of which can be appointed as lay people, who are involved, generally speaking, in the educational process. That is, one might be a chancellor of a university, or the like. They might be involved in certain of the operations of our large voluntary agencies or they might be drawn from other fields of activity that are at the interface between science and its application in society.

Now, this group by law must approve a grant before it can be paid by the National Institutes of Health. Thus the identical review takes place initially at a technical level. It is then reviewed by the Council more on a policy and program level basis, to determine whether the grant fits within the policies and guidelines program of the Institute, and whether it has characteristics that merit payment.

The Council then recommends the payability of the grant to the Surgeon General who cannot pay in the absence of that recommendation, but who can withhold payment if there is violation of some policy or guideline that had been set down for the operation of the program. But in general, provided that funds are available, a high-priority grant, recommended to the Surgeon General by the Council having been previously approved by the study section, would be paid.

Mr. DICKINSON. Now, to recap very, very briefly, as I understand it—I don't want to belabor the point but I think it is necessary that we do get into how these decisions are arrived at if we are going to later get around to justifying what was done, who made the decision.

If a study is proposed, it is approved by these two Boards?

Dr. SHANNON. Yes, sir.

Mr. DICKINSON. One reviews the actions of the other. Would that be a correct statement?

Dr. SHANNON. The study section makes a technical judgment outside the context of the budget, or outside the context of the program planning activities of the Council. In other words, the Council is responsible for advising the Surgeon General on the conduct of activity in a total area of science such as mental health.

Mr. DICKINSON. All right.

Dr. SHANNON. So that the Council reviews the action of the study section and determines whether indeed this activity that has been recommended by the study section fits into the program at NIH and merits support. If they agree to this, they so recommend it.

Mr. DICKINSON. All right. And the ultimate authority or say-so is in whom, the Surgeon General?

Dr. SHANNON. It is in the Surgeon General, but for practical purposes this is delegated to the Institute Director.

Mr. DICKINSON. I see.

Dr. SHANNON. The Institute Director, on the other hand, in questions of specific grants that involve policy issues will confer with my office or with the Surgeon General before taking action.

Mr. DICKINSON. So regardless of who initiates a proposed study, you have a study group to study——

Dr. SHANNON. Yes.

Mr. DICKINSON (continuing). To study the desirability of it outside of policy.

Dr. SHANNON. Yes, sir.

Mr. DICKINSON. Then you have a Council that makes a study and recommendation considering policy.

Dr. SHANNON. Yes, sir.

Mr. DICKINSON. And then that is sent up to you and by delegated authority, then you have the ultimate approval or disapproval.

Dr. SHANNON. The Surgeon General has the ultimate approval.

Mr. DICKINSON. Well, he does and you act in his stead.

Dr. SHANNON. Yes.

Mr. DICKINSON. Thank you. That is all.

Mr. REUSS. Let me give you a number of the foreign research projects funded by the Department of Health, Education, and Welfare in the last several years at the time of our balance-of-payments crisis and ask you in each case to justify them individually—the reason for undertaking them at a time of balance-of-payments crisis, whether they could have been performed in this country, their value to the United States, and whether they could have been postponed for a year or two.

Here is the list of these projects.

Project No. MH 04547-05. This was a grant of \$79,573 to Norwegian social scientists to study the political, economic, and family life of geographically isolated communities in Norway.

Project No. MH 06622-03, \$57,000 to Norwegian psychiatrists to determine the geographical movement in Norway of mentally unstable persons.

Project MH 05784-04—

Mr. KELLY. Could you state the numbers again, please?

Mr. REUSS. MH 05784-04. In each case I will identify these more fully: \$92,968 to an investigator in Limuru, Kenya, east Africa, to study the monkeys of east Africa in their natural habitats, with particular reference to their eating habits, troop size, and behavior. The project includes the raising of live monkeys in captivity, their breeding habits, and the growth and development of infant monkeys.

Project MH 10260-01, a grant to a Canadian psychologist to compare the learning abilities of Canadian Indians and Canadian white children.

It would be interesting to us to know why a comparison of the learning abilities of American Indians and American white children wouldn't have been more in the national interest.

Project 7GX-623-02S1, \$51,000 to three social scientists in London, England, to study the role under socialized medicine of the family doctor in an English community.

Project MH 08994-01, \$3,500 to a sociologist in Beirut, Lebanon, to investigate the leadership patterns of a Lebanese community, including the recruitment, motivation, and strategies of Lebanese community leaders.

Project MH 08654-01, \$2,900 to a psychiatrist in Canada for a study of group influence and conformity.

Project MH 05658-03, \$25,765 to a Swedish scientist to study the effects of rapid urbanization on a community in Sweden—the occupations, family relations, political attitudes, leisure activities, alcoholism, mental health, and delinquency.

Project MH 07957-01, \$3,500 to a New Zealand investigator for a study of a forest tribe in New Guinea, to inquire how this primitive tribe comprehends the world about it and how the tribe classifies plants and animals.

Project MH 08212-01, \$3,500 to a French sociologist to study 600 urban French families, with particular reference to the degree of mutual understanding and togetherness within the family, its organization, which family members perform the household chores, and the degree to which family plans are carried out.

Project MH 10485-03, \$38,933 to a psychiatrist in Canada to evaluate the effectiveness of psychotherapy.

Project MH 11793-01, \$2,389 to an American teaching in Ghana, to make a study of Ghanaian factory workers with particular reference to their education, place of origin, processes of hiring and training new workers, adjustment problems, levels of productivity and supervisory problems.

Project No. MH 06261-03, Dr. Herbert Jasper, of Canada, a grant of \$65,000 to the International Brain Research Organization for a historical work called "Survey of World Resources in Brain Research."

Project AI 01322-09 to a Canadian doctor, a grant of \$224,000 to study allergens of ragweed and several factors relating to immediate hypersensitivity in man.

A \$48,930 grant—this is project MH 00727-03, to a Canadian investigator at McGill University to study the community management of rural mental patients in eastern Canada.

Project NB 03014, \$50,000 to a British scientist in part to study color blindness of a woman who lives in Los Angeles, Calif. I believe under this project the woman was to be flown to England for study.

(The NIH grant justifications follow:)

NATIONAL INSTITUTE OF MENTAL HEALTH

MH 06286-03, University of Montreal (Canada)

"ORIGIN AND SOURCES OF MODERN DYNAMIC PSYCHIATRY," \$11,050 (TOTAL COSTS)

Psychodynamic therapy is one of the most important treatment tools available today to psychiatrists caring for the mentally ill. The National Institute of Mental Health awarded a 3-year grant, which was activated in 1962, in amounts of \$5,350 for the first year and \$2,850 for the 2 subsequent years for a study of the origins and sources of modern dynamic psychiatry. The principal investigator on this project was an American psychiatrist at the University of Montreal.

The investigator is considered to be uniquely competent to undertake this project, having a past record of outstanding studies in psychiatric history combined with broad personal experience in the practice of psychiatry in Europe and the Western Hemisphere. His book is expected to throw new light on the past growth and possible future avenues of development of the practice of psychotherapy.

The initial grant was made before the U.S. balance of payments became a factor in limiting the support of research abroad, and the question of postponing the award did not arise at the time. While it would have been theoretically possible for this study to have been carried out in the United States, the investigator was judged to be the best qualified psychiatrist to conduct this work because of his combination of language skills and broad historical background considered essential to the task.

MH 04547-05, Institute for Social Research (Norway)

"A STUDY OF ISOLATED FAMILIES AND COMMUNITIES," \$79,573 (TOTAL COSTS)

The investigator and his research team have, with NIMH grant support, been carrying out a study of family behavior and personality development in mountain areas of Norway in which small communities, and even individual families, are comparatively isolated, geographically, from each other.

The setting in Norway provided an unusual natural laboratory for studying families in isolated rural communities having little contact with the surrounding larger society. The setting was unique and the investigator selected was considered to be an exceptionally capable behavioral scientist, capable of producing a meaningful study.

Studies of these isolated communities have important implications in two directions. In usual studies of the relationship of personality to social environment, the social environment is so rich and complicated that the investigator cannot hope to get a complete picture of it. In the areas being studied, members of a family may have contact with persons from other households as seldom as once a week and with persons outside the community once or twice a year. It is, therefore, possible to study such interactions quite completely. The isolated home in the isolated community thus offers an important opportunity for a basic study of the relationship between environment, social interaction, and personality development. The study of geographic, and to some extent social isolation, may also have important implications for the study of the effects on mental health of other forms of isolation, such as the cultural isolation of minority groups and the isolation imposed in such institutions as mental hospitals and prisons.

The first award for this project was made in 1961 before the U.S. balance-of-payments problem became a consideration in the award of NIH grants abroad. Nevertheless, postponement of this project would have been questionable in view of the limited opportunities to conduct such studies and the rapid extension of communication and transportation facilities that is continually reducing the isolation of communities.

MH 06622-03, University of Oslo (Norway)

"CLINICAL, SOCIAL, AND GENETIC ASPECTS OF PSYCHOSES," \$57,000 (TOTAL COSTS)

There is a recognized lack of information on the natural course of mental illnesses and the long-term effects of various methods of treatment. As a part of the attack on the problem, in 1962 the National Institute of Mental Health awarded a 5-year grant for \$15,000 annually for a series of intensive followup studies on the clinical, social, and genetic aspects of functional psychoses.

This is a field of major importance in the national mental health program. Not only is the investigator an outstanding psychiatrist, experienced in epidemiological research, but Norway offers unique features for a much-needed long-term study in psychiatric epidemiology. A nationwide system of central registration of mental illness, which has been in operation in Norway since 1916, is considered to be the best of its kind in the world. The small size of the country and the available data on its population make possible personal followup studies by psychiatrists which can be expected to approach a significantly higher percentage of success than would be possible in the United States.

One of the main interests of the series of research studies carried out by the investigator and his associates is the evaluation of prognostic factors in relation to schizophrenic deterioration. Psychiatrists through the followup studies are weighing the prognostic value of different symptoms and syndromes. The assessment includes the study of clinical symptoms, working capacity, adjustment to family and social environment, and capacity for enjoyment of life. Not only is information from Norway's nationwide register of mental illness already available for research on automatic data processing cards, but the criteria for psychiatric diagnosis are uniform, thus further enhancing the usefulness of the records. This study could not be duplicated in the United States today.

The epidemiological study is one of unusual promise in a field in which relatively little good work is being carried on elsewhere. The grant, however, despite its exceptional merit, was awarded in 1962, before the unfavorable U.S.

balance of payments became a factor in the consideration of NIH research grants. The urgency of the project can only be weighed against the very heavy costs of caring for the mentally ill in the United States, and the promise that results from research of this kind will rebound to the United States in terms of our better understanding of mental illness, its prevention and treatment.

MH 05784-04, National Museum Center for Prehistory and Paleontology, Nairobi, Kenya

"RESEARCH ON THE PRIMATES OF EAST AFRICA," \$92,968 (AMOUNT AWARDED THROUGH 4 YEARS OF SUPPORT)

This project, which of necessity is conducted in Kenya, has as its aim the study of the behavior, ecology, natural history, breeding, growth, and development of the primates of East Africa. Two main approaches are used—fieldwork and the study of a large collection of live animals at the Tigoni Center.

It may be appropriate here to indicate why sizable amounts of money are spent for studies of primates and to clarify the relation of these studies to the problem of mental health. There are several reasons for supporting research of this type. Among them is the need to understand those aspects of behavior which are unique to the human species; to accomplish this it is absolutely necessary to undertake comparative studies of the behavior of subhuman species. This approach is required, in addition to others, if we are to be able to make any reasonable statement about what part of man's behavior is culturally defined, and, therefore, more readily responsive to environmental changes. Thus, the National Institute of Mental Health does not support this work in Kenya because we are especially interested in the study of monkey behavior, as such, but because we are very interested in the implications which these studies have for a deeper understanding of human behavior.

In the preliminary scientific review, a special panel of experts in primatology felt the project to be important and timely. These reviewers noted specifically that if the project were not funded now, it is possible it could never be done. By Government policy, the Kenyan forests—home of the primates—are being cut down. At the same time, costs of labor are rising rapidly. Within a few years it is expected that many of the primate resources for this study will no longer be available. Much of the potentially valuable research on east African primates must be done in the field where the animals live, and such research can be conducted more effectively from a permanent base of operations such as the Tigoni Center. The types of primates being collected and studied under this project are not available in their natural habitats in the United States.

Both the preliminary scientific review panel and the National Advisory Mental Health Council felt that the Tigoni Center was a unique research organization, which is performing functions of great significance for primatology. It is readily accessible to the Kenya road system, close enough to Nairobi for easy access to supplies, yet within reach of the habitats of many of the least known primate species. The budget for such a project was felt to be extremely reasonable. In all, the reviewers believed that the integration of the qualitative and quantitative information gathered through this project is likely to provide a knowledge of East African primates which is much more sound than anything done previously.

MH 10260-01, University of British Columbia (Canada)

"ETHNIC DIFFERENCES IN CONCEPT LEARNING," \$2,700 (TOTAL COSTS)

The investigator is a U.S. citizen, now at the University of British Columbia, who has been conducting what scientific reviewers consider to be most promising research on differences in learning, and ways of diminishing such differences, between children of different ethnic groups. His work will have important implications for the education of culturally deprived groups in the United States if the training methods he is developing prove transferable among different ethnic and cultural groups.

In earlier research, not supported by NIH, the investigator explored emotional and motivational factors affecting learning in Maori and European children in New Zealand. He repeated this research, for purposes of comparison and validation, with white and Indian children in British Columbia, exploring, for instance, the extent to which the emotional reactions of the Indian child to

school, to white personnel in the school, and to the tasks expected of them in school, differ from those of white children of the same age and differ in a way that interferes with learning.

One year of NIMH grant support was awarded to investigate the cognitive factors which may also enter into the learning difficulties of the Indian children. He is exploring the possibility that there are significant differences between the white and Indian children in approaching a new learning situation, that the Indian children are less likely to show evidence of verbal mediation and to use hypotheses systematically and efficiently, and that they will show significant improvement when practice is provided in this kind of response.

While research on ethnic differences in concept learning could and is being conducted in the United States, much of the merit of this piece of research lies in the investigator's own experience and in the testing and training methods he is developing. He has done previous research with the Indian children he is studying under this grant and he has good relations with school officials. The study of ethnic differences is a particularly sensitive and emotion-laden area. The investigator is working in an unusually favorable setting for such work.

This project is in a field of major importance to such ongoing U.S. programs as the poverty program.

BUREAU OF STATE SERVICES, DIVISION OF COMMUNITY HEALTH SERVICES

CH-00065 [7GX-623-02S1], *Institute of Community Studies, London*

"THE ROLE OF THE FAMILY PHYSICIAN IN THE COMMUNITY"

This study of medical care in Britain under the National Health Services is concerned with the nature of the care provided by general practitioners and with the satisfactions of both patients and their physicians. A random sample of approximately 1,200 adults in England and Wales has already been interviewed to obtain information about the extent to which they receive family care, personal care, preventive care, and domiciliary care from their medical practitioners. They were also asked their views about this care. The physicians of these patients were similarly interviewed about the organization of their practices, their views on their role in the community, and their satisfaction with their work and the conditions under which they practice. Data from these two sources are currently being correlated, to determine the ways in which patient satisfaction is related to the organization of practice and attitudes of the physicians.

Studies of medical practices to date have generally been carried out from the point of view of either the doctors or the patients. No comprehensive analysis exists relating the attitudes and satisfactions of physicians to those of their patients.

Increased specialization has called into question the role of the general practitioner, especially in the United States. Transformation of his role into one of a family physician has been proposed, but patients' reactions to the kinds of services general practitioners provide are not known. How general practitioners conceive their functions also has not been explored enough. This study will contribute to knowledge of patient care problems and ways to better organize medical practices.

The data to be obtained from this study may also provide insight into the needed curriculum changes in medical schools as well as the continuing education needs of physicians in dealing with the patients' clinical, emotional, and social needs.

The interviewing of both the patients and their doctors makes the project rare and comprehensive. Such a defined population sample and related physician sample exists uniquely in Great Britain under the National Health Services and is not found in other western countries. Furthermore, study in a locale where ability to pay is mostly irrelevant to the utilization of services will yield clearer results than could be obtained in the United States.

The applicant is one of the British experts in the field of methodology of opinion/survey research. The facilities of the sponsoring institution are also excellent for this type of study and the cost is modest by domestic standards.

Because of the originality of the project design, it will provide a national systematic assessment of patient and practitioner opinion on such important questions as personal, family, and preventive care. Such data and analyses

will have value and utility for the United States and provide a perspective for understanding and improving the provision of medical services.

In view of the passage of the health insurance benefits program, as well as the health professions program, the Division is extremely interested in assessing the relationship between physician practice organization and patient satisfaction and expectations. The study provides a unique opportunity to obtain results that will be of great value in setting the stage of comparative studies here and demonstrating which factors of patient satisfaction in the United States are related to the organization of care and which are cultural and social.

In view of the great dearth of research in the field of medical practice, it is important to take advantage of every opportunity to learn more about rapidly changing systems of medical care. Fortunately, an investigator was available at this particular time to investigate problems central to the development of our program. The results of her work are being awaited, to be applied to the improvement of medical practice as well as to provide guidelines for future needed research in the United States.

NATIONAL INSTITUTE OF MENTAL HEALTH

MH-08994-01, American University of Beirut, Beirut, Lebanon

"PATTERNS OF COMMUNITY LEADERSHIP," \$3,500 (TOTAL COSTS)

The investigator is a young American sociologist on the faculty of the Center for Behavioral Research at the American University of Beirut. His research project was designed to (a) develop instruments for investigating patterns and systems of community influence in Lebanon, (b) test these instruments in a Lebanese community and produce evidence on the leadership structure of a selected community, and (c) on the basis of available evidence, suggest a final set of instruments which may be used in a large scale comparative study of community leadership in selected Lebanese communities undergoing social change. He utilized several methods of studying community leadership and will compare his results with those obtained by scientists in the United States. He hopes to determine the conditions under which the various methods may be useful. In addition to studying the methods for identifying leaders, he studied characteristic roles of leaders in a rapidly changing society, related influence patterns to social structure, compared patterns of leadership with those in studies conducted in the United States with a view to developing greater understanding of leadership recruitment, motivation, roles and strategies. Cross cultural research projects of this kind by their nature cannot be carried out solely in the United States.

The expert panel of scientific reviewers which considered the pilot research project felt that the study would contribute to our knowledge of community structure by providing comparative data from another society. The investigator has had considerable experience in the kind of research proposed in this project and the small sum requested for the research was felt to be an excellent investment.

Projects of this kind are only possible when the proper conditions and a qualified investigator are available at the same time and in the same place. Postponement of the project often results in a lost opportunity which may never reoccur. It is impossible to evaluate the effect of the loss of knowledge were this project not to have been funded. However, it is clear that the loss would have exceeded the \$3,500 cost of the project.

MH-08654-01, University of Alberta, Edmonton, Alberta, Canada

"EFFECTS OF GROUP PARAMETERS ON INDIVIDUAL JUDGMENTS," \$2,900 (TOTAL COSTS)

This small research grant, awarded to an experienced U.S. investigator at the University of Alberta, concerns the study of how opinions of individuals are affected by the opinions of the group. In considering this interesting proposal in social psychology, the scientific review panel noted its potential importance in the further understanding of group influence, and the additional possibility that it could develop implications for the understanding of deviant behavior.

The investigator has found two characteristics to be particularly important in group influence: the degree to which the opinion of the group differs from that of the individual, and the degree of consensus of group opinion. She found that the greater the consensus and the more the group opinion or norm differs from his own, the more an individual's opinion will change to conform to that of the group.

She also was interested in the influence of the group on the individual when the issue is of importance to him and when it is not. She found that diversity of group opinion enhanced opinion change to the norm on a neutral issue. Just the opposite effect occurred when the individual felt involved in the issue: varying opinions in the group facilitated an even stronger expression of opinion away from the group norm.

This research proposal is of a kind which derive their promise from the excellence and originality of their design rather than from a unique situation or setting. Theoretically, therefore, similar research might have been carried on in the United States. However, to the best knowledge of the reviewers of the application, such work was not being done in this country. Similarly, this type of research might, theoretically, be postponed. However, this 1-year study has already resulted in two manuscripts which have been submitted for publication in scientific journals. Postponement of the award would have delayed this contribution to our understanding of group influence and conformity as well as the continuing contribution and development of a highly regarded U.S. scientist.

MH-05658-03, Uppsala University (Sweden)

"EFFECTS OF URBANIZATION ON SOCIAL STRUCTURE," \$25,765 (TOTAL COSTS)

Most opportunities to study very rapid urbanization and its effects on mental health are found in the developing, non-Western countries. The decision to locate a new, international airport at the small town of Marsta, Sweden, presented an unusual opportunity for such a study in a Western country. It was estimated that the population of the Marsta area would increase from about 3,000 in 1960 to 40,000 or 50,000 by 1963. The investigator, a U.S.-trained sociologist at nearby Uppsala University, was able to gain baseline data on the community before rapid growth began.

The 3-year NIMH grant, which has now been completed, enabled the investigator to begin what he plans to be a 15-year study (without NIMH funding) and to begin it at the critical point, before the process of urbanization had begun. The investigator is using basic demographic data obtained from official sources and period surveys of groups of Marsta residents, both original inhabitants and newcomers, to get a comprehensive picture of the social structure of the community and changes in such areas as occupational groupings and educational background of the residents, the network of voluntary organization, leisure activities, political attitudes, and general values. He will compare the changes which actually take place with those which community planners intended to bring about. He is also studying the structure and function of the family to learn how it, and its members, adjust to change in the community and how this adjustment varies with family members' social and psychological backgrounds. Social problems generally associated with rapid urbanization, such as alcoholism, delinquency, and criminality, are also being studied for a better understanding of the kinds of persons involved in, and the process that produces these problems. It is hoped that the results of the long-term study will increase our understanding of the mental health problems related to urbanization which are so pressing in the United States.

By its nature this project to study the results of a specific and unusual situation, could neither have been carried out in the United States nor postponed. The investigator's application was submitted early in 1961 and his grant awarded in 1962 before the U.S. balance-of-payments problem became a factor in the award of NIH research grants.

MH 07957-01, University of Auckland (New Zealand)

"LANGUAGE AND THE PERCEPTION OF A NATURAL ENVIRONMENT," \$3,500 (TOTAL COSTS)

This is a basic research project in cultural anthropology. The investigator has spent approximately 8 months living with a forest tribe in central New Guinea: the Karam. The region is one of the few left in the world where the

people are only beginning to come into contact with Western culture. Any qualified observation of people in such an area will provide basic information valuable in understanding cultural development and the more complex societies of the modern world. They must be done, however, before the old culture has been influenced by the new. Consequently, when the opportunity for such anthropological studies occurs, it cannot be postponed or that opportunity is lost forever.

The investigator has broken new ground by investigating systematically how the forest as such is used by the Karam, and how they classify the plants and animals in it. The determination of the botanical and zoological classification systems of a given people gives important understanding of how they perceive the world around them and what they do with it. In addition to this novel systems approach, the investigator also examined the more usual subjects of anthropological studies, such as the social customs of the people and their communication and leadership patterns.

The export study of other cultures is useful in many ways to increase our understanding of our own society and how to make it function more effectively. This study of a changing civilization was considered to be invaluable, because the society will never be the same again. Such a project could not have been carried out in the United States because such population resources do not exist in a modern industrialized country.

In the consideration of this project, the expert panel of scientific reviewers noted that the research utilized talents and human subjects not available in the United States, and felt that the results would advance psycholinguistics and its mental health applications back in New Zealand, in the United States, and elsewhere in the world.

The investigator is planning to publish a full account of his studies of the Karam. To date he has published five articles in scientific journals reporting his results.

MH 08212-01, National Center of Scientific Research (France)

"URBAN FAMILY STRUCTURES AND MENTAL HEALTH," \$3,500 (TOTAL COSTS)

This study of the structure and functioning of the urban French family in various social classes is the French portion of an international study which was originated and organized by U.S. investigators specifically to provide data from another Western culture to compare with their own study carried out in the United States. Other portions of the study were done in Belgium and Japan.

Using a questionnaire developed by U.S. investigators, which she adapted for the French culture, the investigator studied 600 families in Paris and Bordeaux, exploring such aspects of family life as the organization of authority within the family, the division of household tasks, the degree of mutual understanding and closeness within the family, planning related to the household and family, and ties between the parents-children family unit and the larger kin group. It is hoped that her findings, when compared with those of other parts of the international study, will contribute to our understanding of the role of family relationships in mental health. Her basic study was supported by the French National Center for Scientific Research. A 1-year grant from NIMH enabled her to study a larger number of families and so increase the value of the study for comparative purposes.

The willingness of the investigator, who is a well-known family sociologist who has written several books and numerous scientific articles, to undertake the French portion of the study was felt by the reviewers to assure that it would be a meaningful and worthwhile contribution to the larger project. The reviewers also commented on the value to the U.S. study of comparative studies of urban families in other cultures. This value would have been greatly diminished, if not lost, by postponement of the comparative projects as the U.S. study was published in 1960. The NIMH grant was awarded in 1963, already a lapse of 3 years although she had carried out a pilot survey, funded by French sources, in the interim.

MH 10485-03, McGill University (Canada)

"MEASUREMENT OF THERAPIST-PATIENT INFLUENCE," \$38,933 (TOTAL COSTS)

A longstanding problem in the treatment of mental illness is that of evaluating the effectiveness of psychotherapy. Research in this difficult but important area has so far produced little useful information.

In what the reviewers considered to be one of the most interesting and promising studies in this area, the investigator, now a psychiatrist at McGill University, is developing a method for measuring the influence of the therapist and patient on each other by studying changes which come about during therapy in the meanings which both the therapist and patient attach to concepts related to the patient's major problems. His method is based on the rationale that psychiatric illness involves a disordering of meanings or ways of perceiving significant persons or situations, and that psychotherapy involves a reordering and alteration of those meanings. During therapy, and the repeated scrutiny and discussion of the patient's problems, there will be a considerable interplay of the values of both the patient and the therapist and each will influence and modify the other's evaluation of the patient's problems. The investigator hopes to measure this mutual influence and to look for a possible correlation with improvement, or lack of improvement, in the patient. For instance, if the patient and therapist are too far apart in the meanings each attaches to key concepts related to the patient's problems, a meaningful interchange between the two, and successful therapy, may not be possible.

The investigator carried out the first phase of this project in the United States when he was on the staff of a U.S. institution. When he moved to McGill University, he applied for continuation of the project under an NIMH foreign research grant. The National Advisory Mental Health Council felt that a foreign grant was justified because of the need for research in the critical area of psychological treatment of mental illness, because of the investigator's established reputation as a sophisticated investigator in this difficult area, and because of the originality and excellence of his research design, because of its originality, this particular piece of research could not have been performed by another investigator in the United States. The award of the foreign grant for its continuation could not have been postponed without diminishing or losing the value of the work already carried out in the United States.

MH 11793-01, University of Ghana

"FACTORY WORKERS IN A PREINDUSTRIAL SOCIETY," \$2,389 (TOTAL COSTS)

The investigator is a U.S. citizen currently teaching at the University of Ghana and conducting research in urban and industrial sociology. Her NIMH-supported project is an exploratory study of five aspects of the life of the factory worker in Ghana: his social background, his adaptation to the factory situation, his aspirations, his family contacts, and the use he makes of his education. The investigator is comparing workers in factories which have drawn their labor force primarily from one region, with the workers thus retaining many ties among themselves and their kin, with those in factories which have drawn their workers from several areas.

The study is expected to add to our understanding of the problems of personal and social adjustment involved in migration from rural to urban areas and in adapting to factory work in an industrialized society, and of the role education plays in this process.

A study, such as this one, of the basic process of industrialization could not have been carried out in the United States by either a United States or a foreign investigator. Ghana is at an early stage of industrialization, but will industrialize rapidly, thus providing an opportunity to study in a comparatively short time what was a much lengthier process in the now developed countries. Ghana also provides an opportunity to study in one small area workers drawn from regions with different family systems and to contrast the ways in which family structure affects the adaptation of the worker to urban, factory life. The investigator, who has previously conducted research in Ghana, and who was considered by reviewers of her application to be well trained and to have a good understanding of the problems she is studying, is expected to be able to make good use of this unusual research opportunity.

Research on the mental health problems involved in rural to urban migration and individual adjustment to factory life is urgently needed in view of the pressure of such problems in the United States and in the emerging countries in which it has extensive aid programs. The opportunity to study the basic processes involved in societies at early stages of industrialization and urbanization, and so provide basic information for the study of the much more complex processes in more developed societies, will soon be lost as countries such as Ghana rapidly become industrialized.

MH 06261-03, Dr. Herbert Jasper, International Brain Research Organization

"SURVEY OF WORLD RESOURCES IN BRAIN RESEARCH," \$65,000 (COSTS THROUGH 3 YEARS SUPPORT)

In 1962 the National Institute of Mental Health awarded a 2-year grant to Dr. Herbert Jasper, Executive Secretary of the International Brain Research Organization (IBRO). This research project had as its aim the development of a comprehensive survey of current resources for research and training in the basic sciences of brain research.

In considering this application, the preliminary scientific review group noted that Dr. Jasper was an outstanding scientist and administrator of international reputation, and that a survey of world resources in brain research would be a very valuable source of departure for future scientific developments. Such a survey of foreign laboratories could not be carried out within the United States. Although not all the expenditures under the grant were to occur outside the United States, the reviewers recognized the international character of IBRO and the fact that this would be a foreign research grant. IBRO, with its further affiliation with UNESCO, was recognized as an exceptional organization with excellent contacts with brain laboratories throughout the world. The reviewers specifically noted that no other existing organization was equipped to carry out such a task. These views were confirmed by the National Advisory Mental Health Council, and a high priority was assigned to the project.

In June 1965, when a 2-year application to continue and complete the project was submitted, the scientific reviewers commented on the valuable contribution to brain research which had already resulted from the project. It was expected that both a cross-fertilization of the brain sciences and an improvement of international collaboration in these fields were to be expected from the continuation and completion of the project. The reviewers again noted the high scientific merit and competence of Dr. Jasper, and commented on the fact that so many eminent brain scientists had cooperated in the pilot survey demonstrated the faith that the world brain research community has in the principal investigator and sponsoring organization.

This grant was reviewed early in 1962 at a time when the U.S. unfavorable balance of payments had not yet become a consideration in the award of NIH foreign research grants; hence, the question of postponing it indefinitely did not arise. The fast moving state of research in the brain sciences argues the timeliness of supporting this project currently.

NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

AI 01322-09, McGill University, Montreal, Quebec, Canada

"RAGWEED ALLERGENS AND HYPERSENSITIVITY IN MAN"

The above-mentioned grant was given careful and specific screening at all reviewing levels, both within and outside this Institute. Explicit attention was given to the qualifications of the application in regard to fulfilling the foreign criteria.

The summary sheet documents the consensus as follows:

Foreign criteria.—Foreign criteria are fulfilled by the talented and unusually well-trained staff with unique laboratory clinical facilities and the assurance of continued contribution to the advancement of knowledge in allergy.

The statement regarding the uniqueness of the laboratory clinical facilities is evidence of the absence of an equivalent resource in the United States.

The value of the project can be gaged by the fact that approximately 19 million Americans suffer from hayfever. The laboratory in question is a major contributor to our knowledge of this very widespread disease. The high priority given to the application by primary merit review was specifically noted in assessing the application's overall qualifications.

The relative urgency of the research is reflected in the magnitude of the problem as stated above. It was felt that the categorical interests of this Institute, representing the public's interests and reflecting its needs, were deeply involved and required the action as taken.

The grant was awarded within the restraint applied by the Bureau of the Budget to protect our payment deficit. Postponement of payment of the grant was not considered to be in the best interest of the American people because of the high relevance of the research to a serious morbidity problem which, in turn, has strong economic implications.

In summary, the criteria of relation to the health of the American people, the outstanding and/or unique quality of the foreign laboratory, and the obvious relations to the mission of the Institute were specifically and favorably considered at all levels of review.

NATIONAL INSTITUTE OF MENTAL HEALTH

MH 00727-03, McGill University (Canada)

"COMMUNITY MANAGEMENT OF RURAL MENTAL PATIENTS," \$48,930 (TOTAL COSTS)

One of our fundamental requirements in caring for the mentally ill is that of better research knowledge of the effectiveness of alternatives to hospitalization for mental patients. Open hospitals, day and night hospitals, preventive services and rehabilitation programs for the mentally ill were largely pioneered outside the United States. A 3-year grant to the investigator was made specifically to draw upon Canadian experience with community facilities, experience different from that of the United States.

The investigator has been carrying out a detailed analysis of rural community psychiatric services in eastern Canada. The particular locale provided a unique opportunity for the study of a variety of cultural groups in rural areas. The psychiatrist who considers home maintenance of persons who have had major mental disorders must be in a position to anticipate the type of pressures and supports the psychiatric patient will experience in his home milieu, as well as the effect of the patient on his home environment. In rural settings the significant environment which the psychiatrist must consider extends beyond the immediate family.

After surveying the prevalence of popularly recognized psychiatric disorders in three rural Canadian communities, the investigator carried out a series of interviews to explore rural community attitudes toward mental illness and to evaluate how the patients were socially managed in the community. The final results of this research are still under analysis, but the project has been judged to promise findings which can be important to the planning and development of mental health services for mental patients in rural communities in the United States.

A postponement of the research would have delayed, to planners in the United States, the availability of important information at a critical point in the rapid enlargement of the community mental health center concept in the United States. Vast sums are being committed by the Federal and State Governments to construct and staff these facilities over the next 5 to 10 years. Information such as that provided through this study will assure greater productivity from these expenditures and should not be delayed. It should be noted, however, that the investigator submitted his application in 1960, and his grant was awarded in 1961, before the U.S. balance of payments became a factor in the award of NIH research grants.

NATIONAL INSTITUTE OF NEUROLOGICAL DISEASE AND BLINDNESS

NB-03014, Cambridge University Medical School, Cambridge, England

"THE NATURE OF THE VISUAL PROCESS IN THE RETINA"

The investigator is one of the world's outstanding experts in the study of the process whereby light falling upon the photosensitive film of the eye generates the nerve impulse leading to the sensation of vision. This process depends upon the bleaching of several different pigments of the eye. An understanding of these pigments is essential for an understanding of the normal processes of vision and of color blindness, and to achieve means for the prevention and cure of certain blinding diseases—the retinopathies, in which these pigments are damaged or defective.

He has discovered a means whereby the reactions of these several pigments to light can be studied within the living subject. However, to do this, one must find a human subject in whom there is only one pigment present. When, as is normally the case, the several pigments are all present, their reactions are superimposed, and a clear analysis of each is impossible. Within certain rare color blind individuals, all pigments except one are lacking, and a precise analysis is feasible.

In his search for such subjects, the investigator screened over 1,500 medical students in England, and found only 2. The subject referred to from San Francisco, represented an almost unique similar case, and the arrangements which were made for him to study this patient could not have been duplicated in other ways. In his investigations, he is collaborating closely with scientists doing complementary studies at the National Institutes of Health laboratories in Bethesda, and elsewhere in the United States.

The project required the participation of the investigator, who had other patients and responsibilities and equipment in England. The successful completion of this project required activities both in the United Kingdom and the United States. A solution of these problems is an important step toward the ultimate care and prevention of certain causes of blindness. The urgency stems from its essentiality to this objective. The project could have been postponed for an indefinite period. However, this would have delayed the accomplishment of essential steps toward the solution of the disease problems toward which it is directed.

Mr. REUSS. That is a fair sample of some of the HEW projects, and would you now justify them in terms of our balance-of-payments crisis and in terms of their essentiality to the national interest, their possibility of being performed in the United States, and the possibility of postponing them a year or two.

Mr. SHANNON. Mr. Reuss, I can do this. I have notes on most of these. I am not sure that I have notes on all, and I can do it on a one-by-one basis. However, since in the early projects, particularly those relating to mental health, there were certain patterns that relate to certain activities that it might be more profitable for your committee were I to take these and attempt to group them and show where these fit into our domestic effort and why it was felt at that particular point in time that this particular man could make a contribution.

Now, I cannot do that on the basis of the information I have with me but I would be very glad to have such a staff document prepared for you. I will do it either way you wish.

Mr. REUSS. Why not do it both ways? Why not do the best you can now and—

Dr. SHANNON. Will you call out the first number?

Mr. REUSS (continuing). And fill it in later by more details. But in each case concentrate on the essential points which are worthy of grants by the authorities, being fully and continually aware of the grave crisis in the U.S. balance of payments and its effect on this country: Did they have constantly before them the Presidential orders to avoid foreign dollar drain expenditures? How thorough was the exhaustion of resources of the United States so as to determine that these could not in any way have been performed in the United States? How essential were they to the national interest? What was their immediacy? What would have been the cost to the national interest of postponing them for a year or two? Just bear down on these questions, if you would.

Dr. SHANNON. Mr. Reuss, I really think that some of those questions can only be answered in terms of mechanisms that have been set up within HEW, the Public Health Service, and NIH, to address

ourselves to the problem of on the one hand protecting as best we can the outflow of dollars, but on the other, to provide American science with such help as we deem to be essential for rapid progress through expenditures overseas.

Now, I think that the best way to proceed would be having Mr. Reuss permit Mr. Kelly to go over the administrative actions we have taken over the past 5 years and perhaps letting me comment on our attempts to integrate and to make use by quite specific guidelines of limited amounts of talent in the international scene. I think the specific questions about these grants will be answered in terms of the general way we do business.

Mr. REUSS. Anything further from HEW?

Mr. KELLY. Yes. In line with what Dr. Shannon said that it is important to put what we have done in perspective it was the practice prior to the recognition of the seriousness of the balance-of-payments problems——

Mr. REUSS. When did you recognize that?

Mr. KELLY. Beginning in 1962 we began to take a series of actions that were designed to minimize the impact that our programs had.

Mr. REUSS. If I may say so, your time of reaction was a little slow. About 3 years slow, wasn't it?

Mr. KELLY. Well, the size of the undertakings in the total area of research, up until that time, had not demonstrated themselves, or at least we had not recognized the significance of these, as looming large in the field of international payments. But in 1960 we did create an Office of International Research in the National Institutes of Health, and in 1962 we began to take a series of steps, and these steps led to significant discussions and interchange between the Office of the Secretary and the various parts of the Department with particular emphasis on the National Institutes of Health which does the largest amount of research overseas.

Discussions were held with the Bureau of the Budget and with the Office of Science and Technology in an effort to identify the significance of the contribution made by international scientists in the research field.

These explorations made it abundantly clear to all of the professionals involved in the field that it was important that they have access to foreign scientists in the furtherance of the domestic interests of these programs and that this had to be weighed against the impact it had on the balance of payments.

So the first step that we took in 1962 was to restrict the amount of foreign research that the National Institutes would conduct to 4 percent of the total grants awarded in that year. And then in 1964 and thereafter we adopted a more restrictive policy and worked out mutually agreeable ceilings with the Bureau of the Budget as to the maximum amount of research that could be conducted affecting the balance of payments.

Mr. REUSS. While you are on those ceilings—they affected grants you might make, did they not?

Mr. KELLY. Yes, sir.

Mr. REUSS. They did not, however, affect contracts you might make, did they?

Mr. KELLY. Well, we have used the contractual arrangement only to a limited degree. I think the total of the contracts that we had affecting the balance of payments is something like \$850,000.

Mr. REUSS. My question was were they imposed on contracts.

Mr. KELLY. They were imposed only on grants.

Mr. REUSS. They were not imposed on contracts.

Mr. KELLY. That is correct. At the time they were imposed, I don't believe they were imposed on contracts and I think the maximum of contracts on which they have been used is about \$850,000.

Mr. REUSS. Over how long a period?

Mr. KELLY. In 1 year.

The second step that we took, Mr. Chairman, to try to minimize the impact on the balance of payments with limited impairment of the research program was that on indirect cost of research. We eliminated this entirely in 1962 from all our grants that involved expenditures abroad.

Mr. REUSS. Before we leave this matter of holding the ceiling on contracts, would you tell us when this ceiling was imposed?

Mr. KELLY. I think 1964 was the beginning of the ceilings and we had ceilings for 1964, 1965, and 1966.

Mr. REUSS. And your testimony is that these ceilings did not apply to contracts.

Mr. KELLY. That is my understanding.

Mr. REUSS. And is it not a fact that in 1964 your contracts were in the amount of \$402,000 but that in the next year, 1965, they went up to \$867,000, more than doubled?

Mr. KELLY. Those figures sound correct to me. I do not have them with me.

Mr. REUSS. Doesn't that look as if somebody was taking advantage of the hole in the ceiling?

Mr. KELLY. I do not believe so. I will be glad to submit a statement as to what caused the increase. I don't have it available.

(The statement referred to is as follows:)

FOREIGN RESEARCH CONTRACTS OF THE NATIONAL INSTITUTES OF HEALTH

The increases noted in NIH research contracts with foreign institutions as related to NIH research grants abroad are as follows:

Fiscal year	Research contracts		Research grants	
	Amount	Increase	Amount	Increase or decrease
1962.....	\$168,410		\$13,410,000	
1963.....	172,223	+\$3,813	14,956,000	+\$1,546,000
1964.....	402,753	+230,530	13,759,000	-\$1,197,000
1965.....	867,008	+464,255	11,467,000	-\$2,292,000

As these figures indicate, the increases in contracts were much smaller than the decreases in grants.

Foreign contracts, which represent less than 2 percent of total contracts, have grown roughly in proportion to the total use of contractual services in support of the research programs of the Institutes, as indicated in the attached table. The continued increase in foreign cancer chemotherapy contracts in fiscal year 1965 reflects the intensified search for alkaloids and other exotic plant extracts as potential antitumor agents, as well as increased need for noncommercial steroid compounds in small quantities for testing in U.S.

laboratories. Activities such as those of the cancer chemotherapy program are particularly appropriate for support through the contract mechanism. In the view of this Department, these projects require more Federal direction of the manner of performance and the product to be provided than would be appropriate for the grant mechanism.

Funds budgeted and appropriated for research grants cannot be used to finance contracts. Research contracts are financed from funds made available for the "direct operations" activity of each Institute or for special programs such as the cancer chemotherapy and leukemia programs of the National Cancer Institute and the organ transplantation immunology program of the National Institute of Allergy and Infectious Diseases.

Transfer of funds from the research grants activity to these other activities can be made only in limited amounts and only with the approval of the Secretary of Health, Education, and Welfare in each instance.

Major sources of the increase in research contracts abroad from fiscal year 1963 to 1964 were the expansion of the collection of background data on cancer risks among Japanese migrants to the United States and beginning of a parallel study for Norwegian migrants; arrangements with the Excerpta Medica Foundation for abstracts in English of scientific literature on arthritis and rheumatic diseases; and provisions through the World Federation of Mental Health and the Pan American Health Organization for a flow of current scientific information on mental health through the National Clearinghouse on Mental Health Information to American scientists and practitioners in this field.

From fiscal year 1964 to 1965 the principal increases resulted from tissue-typing methodology contracts to four European laboratories under the new organ transplantation immunology program; and from increased procurement of foreign biometric and epidemiologic data under collaborative projects of the National Institutes of Child Health and Human Development and of Mental Health.

Amounts obligated for research contracts awarded to all contractors and to foreign contractors by the National Institutes of Health, fiscal years 1962-65

Fiscal year	All contractors		Foreign contractors	
	Total research contracts	Cancer chemotherapy contracts	Total research contracts	Cancer chemotherapy contracts
1962.....	\$28,329,314	\$21,195,275	\$168,410	\$127,466
1963.....	39,250,000	23,325,000	172,223	114,600
1964.....	43,774,000	26,135,900	402,753	137,650
1965.....	55,441,771	24,894,000	867,008	171,884

Mr. KELLY. The third step was to establish a more restrictive policy for the approval of a foreign research grant than for a domestic one. We required that such projects have a better-than-average priority rating and we made moral commitments for only 3 years rather than the life of the project, as we customarily do.

We also established a policy that the equipment needed in the conduct of the project would be purchased in this country to the extent that it was practicable to do so.

We adopted a policy of making more frequent payments in order to minimize the period of time in which the funds remained idle and unused overseas.

We adopted a policy that all payments would be made out of local excess or near excess currencies to the extent that such currencies were available. And then we imposed a series of restrictions on the use of funds for foreign travel for both grantees and for our own staff traveling abroad.

Mr. REUSS. I don't like to interrupt you, but is any of this relevant to my question which was for you to state the justification, if any, of the dozen or so projects I asked you about?

Mr. KELLY. Well, I had hoped so, Mr. Chairman, because I had hoped that it would identify for you a setting in which the projects were approved. The whole concept of this medical research program supported by grants is that a series of decisions are made at the levels that Dr. Shannon discussed and they are within the setting of the national policy, the needs of the program, and the resources available. An effort was made to allow the use of international grant mechanisms to support these programs with the decisions being made by the knowledgeable professional people in the field, but their decisions had to be constrained within these ceilings and within these policies, and therefore we believe required a much higher degree of priority and a much lesser amount of research conducted overseas than would otherwise have been conducted.

Mr. REUSS. What was your ceiling in 1966? Wasn't it \$9.5 million?

Mr. KELLY. \$9.5 million; yes, sir.

Mr. REUSS. What did you spend in 1966 in grants and contracts?

Dr. SHANNON. The year isn't over. Our projection is that it will be something less than that.

Mr. REUSS. I beg your pardon?

Dr. SHANNON. I say 1966 is not over but our projection is that it will be somewhat less than that.

Mr. REUSS. What was your ceiling for 1965?

Mr. KELLY. \$10.8 million, Mr. Chairman.

Mr. REUSS. That ceiling has remained substantially stable, at around \$9 or \$10 million ever since 1962, hasn't it?

Mr. KELLY. Well, it is roughly in these proportions. Let me say that we did go through an evolutionary period in working with the Budget Bureau to develop these ceilings and we started out with two ceilings, one that related to the Western Europe countries and a grand total ceiling. The ceiling as originally conceived related to the total amount of the grants and then ultimately we worked up the concept under which we are now operating; and that is, that the ceiling will be the amount which affects the balance of payments. Because of this change, the actual figures would have to be adjusted to give you the figures on a comparable basis for each of the several years. In the material that we submitted to you we indicated that our total obligations had run in the area of \$10 to \$11 million in each of these 5 years.

Mr. REUSS. My question, to which I would appreciate an answer, was the following: Haven't the ceilings remained substantially the same, on the order of \$9 or \$10 million a year since 1962?

Mr. KELLY. That is correct.

Mr. REUSS. That doesn't look very spectacular, addressing yourself to the problem of how you are going to reduce balance-of-payments drains, does it?

Mr. KELLY. But I think it is very clear that had it not been for the adoption of the policies and the imposition of these ceilings that we would have spent a considerably greater sum abroad. During this same period of time the National Institutes of Health total funds available for the support of medical research rose quite markedly. We had been operating at a level for international research of approxi-

mately 4 percent of the total awards made. Total grant awards that are international would be under 2 percent this year.

Mr. REUSS. Do you gentlemen have anything further to say on these projects?

Dr. SHANNON. No.

Mr. REUSS. Before we leave this subject, I have one further question. As I understand it, the 1966 ceiling is \$9.5 million, I have an estimate obtained from your agency of your obligations for the current fiscal year. You evidently are far enough along with it to know what those will be, and they come to \$10,267,000, or considerably over the ceiling.

How is this? What is the point of the ceiling if you don't abide by it, just because wording in the directive establishing the ceiling has a hole in it making the cutting applicable only to grants—not to both grants and contracts.

Dr. SHANNON. Are you dealing with HEW figures when you say that?

Mr. REUSS. Yes. I am referring to the statement you made here today; the one you filed with us: Page 4 your answer to question 1, reads, "1966, net foreign obligations in dollars, \$10,267,000." You have a ceiling of \$9.5 million and if you are in fact piercing the ceiling, as the arithmetic seems to tell me you are. Is this not due to the fact that the regulation has a hole in it which makes contracts not subject to the ceiling?

Dr. SHANNON. You are interpreting the two figures wrong. The first figure is for all HEW. The \$9.5 million is for PHS alone.

Mr. REUSS. What is the ceiling for all HEW?

Mr. KELLY. About \$10.5 million.

Mr. REUSS. \$10.5 million?

Mr. KELLY. Yes, sir.

(The following statement was submitted by the Department of Health, Education, and Welfare in clarification of the question on ceilings:)

The initial ceiling established as a limit on the volume of research in foreign countries was self-imposed by the National Institutes of Health. In fiscal 1962 a policy was adopted which limited foreign research grants to 4 percent of total grants awarded. This policy was continued through fiscal year 1963.

The Bureau of the Budget also initiated a system of ceiling controls which became effective in fiscal year 1963. Under the provisions of Budget Bureau Circular A-58, the Department submits for approval an estimate of its expenditures in foreign countries. These estimates are reviewed by the staff of the Bureau of the Budget and, if acceptable, are established as the limitation for the fiscal year. If the estimates are not accepted by the Budget Bureau, the ceiling is adjusted downward to an acceptable total. Once established, the ceiling can be modified only by submission of a request and justification by the Secretary and the concurrence of the Director of the Bureau of the Budget.

The ceiling established through this procedure is a limit on total expenditures affecting the balance of payments and includes uncontrollable payments, such as Social Security benefits and pensions, as well as those which can be controlled by limiting obligations which result in expenditures, such as research grants and contracts, training grants and direct operations.

Beginning in fiscal year 1964, the Budget Bureau imposed, in addition to the expenditure ceiling, a limitation on foreign research grant awards. The first ceiling so imposed applied to all grants made in foreign countries, irrespective of the effect of such grants on the balance of payments. (Except for Public Law 480 agreements in excess currency countries.) The limitation was \$15 million in 1964. This ceiling was further supplemented by a subceiling of \$8.5 million in the amount of the total which could be used to make grants in the "developed" countries, Western Europe, Canada, Australia and New Zealand.

In 1965 the ceiling was modified to apply only to those payments which affected the balance of payments; i.e., it no longer applied to payments in excess currencies or to equipment purchased in the United States. The amount of the ceiling was adjusted downward to \$10.8 million in recognition of the change in applicability. The subceiling for the developed countries was continued but reduced to \$7 million.

For fiscal 1966 the limitation on obligations for research grants was reduced to \$9.5 million and in recognition of the need for flexibility within this restrictive total, the subceiling was discontinued. Thus, at the present time there are two separate ceilings established by the Bureau of the Budget applicable to this Department for fiscal 1966. These are:

1. A ceiling of \$162,748,000 on total expenditures affecting the balance of payments including social security benefit payments, direct operations overseas, research grants and contracts, training, and all other costs.

2. A separate ceiling of \$9,500,000 on obligations for research grants of the Public Health Service.

Although the obligation ceiling established by the Budget Bureau applies only to research grants, the ceiling on expenditures places an effective limit on total obligations incurred for all activities, including contracts, direct operations, and training programs since it is necessary to control obligations to assure that expenditures resulting from current and prior year obligations will not exceed the ceiling.

Of the total ceiling on expenditures, about \$149,059,000 will be paid in social security benefits. These payments are an entitlement under the law and are not subject to administrative control.

The ceiling of \$9.5 million on research grant obligations by the Public Health Service established by the Budget Bureau will result in expenditures of \$9,440,000. Deducting these two items from the total leaves an expenditure limitation of \$4,249,000 for training activities, research contracts and all other activities. Based on an analysis of amounts payable from prior year obligations and current year payments for current year obligations, this will permit obligations for these activities of approximately \$900,000 for research contracts, \$3 million for training programs, and \$500,000 for all other activities.

The Secretary holds each agency of the Department responsible for conducting its activities within the limits established and these amounts are considered ceilings which must be observed. No obligation in excess of the ceiling will be permitted unless a justification for a revision of the ceiling is approved by the Secretary and the Director of the Bureau of the Budget.

MR. DICKINSON. Mr. Chairman, if I may, I just want you to clear up one point for me if you would, Mr. Kelly. You made a statement that in keeping with your reduction of our expenditures abroad, reducing the balance-of-payments deficit, that you eliminate indirect costs and only started paying direct costs. What does that mean? Give me an example of the indirect—

MR. KELLY. For all of the domestic research grants there is included, in the grant, an amount to cover the overhead costs of the institution. Under the HEW Appropriations Act, up until this year, this has been limited to 20 percent of direct costs. Until 1962 we were allowing indirect costs as well, but up to 20 percent of direct costs in foreign grants, and we eliminated that. The institution has to bear the total cost of overhead and other indirect costs in connection with these grants.

MR. DICKINSON. You mean up until that time in addition to the amount stated in the grant or contract you paid an additional amount of 20 percent of overhead?

MR. KELLY. In addition to the amounts for direct expenses. The stated total amount of the grant would include the allowance for indirect costs.

MR. DICKINSON. I see. Thank you.

MR. REUSS. Now let me turn to Dr. Wilson of the National Science Foundation and ask you, sir, about a number of projects.

STATEMENT OF DR. JOHN T. WILSON, DEPUTY DIRECTOR,
NATIONAL SCIENCE FOUNDATION

(The prepared statement of Dr. Wilson is as follows:)

PREPARED STATEMENT OF DR. JOHN T. WILSON, DEPUTY DIRECTOR, NATIONAL
SCIENCE FOUNDATION

I. AUTHORITY AND POLICY

Statutory authority enabling the National Science Foundation to support research and other scientific activities abroad is contained in the NSF Act of 1950, Public Law 81-507 as amended. The basic authority is set forth in section 3(a) (2) which reads as follows:

SEC. 3. (a) The Foundation is authorized and directed—

(2) to initiate and support basic scientific research and programs to strengthen scientific research potential in the mathematical, physical, medical, biological, engineering, and other sciences, by making contracts or other arrangements (including grants, loans, and other forms of assistance) to support such scientific activities and to appraise the impact of research upon industrial development and upon the general welfare.

The application of section 3(a) (2) to activities abroad is expressly recognized by section 11(c) of the act, "General Authority of Foundation," which states:

The Foundation shall have the authority, within the limits of available appropriations, to do all things necessary to carry out the provisions of this Act, including, but without being limited thereto, the authority—

(c) to enter into contracts or other arrangements, or modifications thereof, for the carrying on by organizations or individuals in the United States and foreign countries, *including other government agencies of the United States and of foreign countries*, of such basic scientific research activities as the Foundation deems necessary to carry out the purposes of this Act * * * [Italic ours.]

The authority and intent to have the NSF support international science activities is further expressed in section 13 of the act, "International Cooperation and Coordination With Foreign Policy," which states:

(a) The Foundation is hereby authorized to cooperate in any international scientific activities consistent with the purposes of this Act and to expend for such international scientific activities such sums within the limit of appropriated funds as the Foundation may deem desirable. The Director, with the approval of the Board, may defray the expenses of representatives of Government agencies and other organizations and of individual scientists to accredited international scientific congresses and meetings whenever he deems it necessary in the promotion of the objectives of this Act. In this connection, with the approval of the Secretary of State, the Foundation may undertake programs, granting fellowships to, or making other similar arrangements with, foreign nationals for scientific study or scientific work in the United States without regard to section 10 or the affidavit of allegiance to the United States required by section 16(d) (2) of this Act.

(b) (1) The authority to enter into contracts or other arrangements with organizations or individuals in foreign countries and with agencies of foreign countries, as provided in section 11(c), and the authority to cooperate in international scientific activities as provided in subsection (a) of this section, shall be exercised only with the approval of the Secretary of State, to the end that such authority shall be exercised in such manner as is consistent with the foreign policy objectives of the United States.

(2) If, in the exercise of the authority referred to in paragraph (1) of this subsection, negotiation with foreign countries or agencies thereof becomes necessary, such negotiation shall be carried only the Secretary of State in consultation with the Director.

By section 3(a) (5) of the act, the Foundation is also authorized and directed "to foster the interchange of scientific information among scientists in the United States and foreign countries."

Under the Economy Act of 1932, as amended, (31 U.S.C. 636), the Foundation has the authority to accept funds by transfer from other departments or agencies of the Federal Government and to use them for the purposes for which the

funds were originally appropriated. On this basis funds have been transferred to the Foundation from the Agency for International Development for the support of science projects in developing countries.

As a matter of policy the Foundation has always believed and acted upon the assumption that Congress established it and supports it primarily to promote the progress of science in the interest of the United States. It has, therefore, viewed its support of research abroad, as well as its support of other international scientific activities, in the light of their importance to the United States.

Research support to foreign institutions from the Foundation (as well as from other U.S. Government agencies) also is affected by certain executive branch policies and agreements. For example, the Federal Council for Science and Technology in a report dated August 18, 1964, outlined the rationale and guidelines for support of research in foreign institutions by U.S. Government agencies. As a further example, on August 1, 1962, the Bureau of the Budget established procedures for the control of Federal expenditures abroad. More specifically, by letter of May 29, 1963, the Bureau of the Budget established a limit of \$750,000 on NSF obligations for research project grants to foreign institutions in Western Europe, Canada, Australia, and New Zealand. This limitation has been continued annually by the Bureau of the Budget. Since its imposition the Foundation has had no difficulty in adhering to the limitation and anticipates no difficulty in the current fiscal year.

Foundation policies governing support of research in foreign institutions are set forth in NSF Circular No. 45, dated December 18, 1964. In considering proposals for research support by foreign institutions, the circular states that the following conditions must be met:

- (1) Support will be granted only for projects that are directly pertinent to NSF's responsibilities for supporting science in the United States;
- (2) The project must be one which can be carried out more effectively by a foreign institution than by an institution of the United States;
- (3) The possibility of indigenous support for the project must have been thoroughly explored and found inadequate; and
- (4) (a) The prospective principal investigator must be of outstanding competence for the performance of the proposed work; or
 (b) unique facilities or geographic location must be essential contributing factors to the success of the proposed project; or
 (c) the institution must offer valuable specialized opportunities for research or research training to U.S. scientists.

If a grant is made to a foreign institution, it must further satisfy additional requirements as follows:

(1) *Facilities*.—Such grants will make use of existing facilities rather than provide funds for new foreign-based facilities, except when new facilities are essential to the research and otherwise unavailable to the foreign institution, and when the success of the project is contingent on geographic location (e.g., certain biological research in the tropics and astronomical observations from the Southern Hemisphere).

(2) *Payment*.—Grants to foreign institutions will—

- (a) exclude payment for indirect costs;
- (b) exclude payment for import duties on equipment or supplies;
- (c) include practicable "Buy American" clauses;
- (d) minimize payment for international travel;
- (e) provide payment in foreign currency owned by the United States (e.g., Public Law 480 funds) whenever possible; and
- (f) provide advance payment of funds only as necessary to support the normal progress of the project.

(3) *Duration*.—Grants will have the minimum duration required for effective prosecution of the research.

By letter of August 2, 1963, the Bureau of the Budget stressed the need to reduce the number of fellowship holders who choose to do their work overseas. However, the National Science Foundation Act (sec. 10) specifically provides that fellows may go to appropriate institutions of their choice. While, therefore, we are not authorized to restrict fellows in their choice of appropriate foreign institutions, we do take into account in the evaluation of fellowship applications the appropriateness of the institution selected for a particular purpose.

II. SCOPE AND HISTORY

"International Science Activities," as the term is used herein, include all NSF activities conducted outside the United States and its possessions and territories, and participation in international organizations, directly or indirectly, in the United States or abroad. (As with most definitions, there are some shortcomings in this one; for example, Project Mohole is not considered to be an international activity, although the eventual drilling will take place outside of U.S. territorial waters.)

Almost all units of the Foundation are to some extent involved in international activities include research support for individual scientists in foreign institutions, support of international cooperative research programs, support to U.S. institutions and individuals for foreign related science activities (research, science education functions, international meetings and foreign travel, studies of foreign science resources, etc.), support of science information activities abroad, and support of science education projects in developing countries (with funds from the Agency for International Development). NSF currently maintains overseas staffs in Tokyo, Japan, (two professional and one secretary), and San Jose, Costa Rica (one professional and one clerical, reimbursed by AID) in support of certain of these activities. In 1964 the Foundation discontinued staff assignments in Paris (one professional and one clerical) and Rio de Janeiro (two professional and one clerical).

The first Foundation grants to foreign institutions were made in September 1954 when \$12,000 was awarded to the University of Brussels for publication of a table of "constants" and \$10,000 was granted to the Naples Zoological Station for the support of "research tables" for use by U.S. scientists. The first international program NSF supported through U.S. institutions was the International Geophysical Year (1957-58). During the 6 fiscal years 1955-60 a total of \$43.4 million was obligated by NSF for this program. In fiscal year 1965, \$23,022,108 out of a total of \$420,400,000 was obligated for international activities as defined above (see attachment B). Attachment A shows detailed tabulations of the Foundation's obligations for research support to foreign institutions by country during fiscal years 1962, 1963, 1964, 1965, and the first half of 1966. Estimates are shown for the second half of fiscal year 1966.

III. CURRENT PROGRAM ACTIVITIES

In discussing the international scientific activities of NSF, we have presented them under two broad interrelated groupings: (a) International activities in research, science education, and science information which are directly related to the NSF mission to strengthen science and science education in the United States; (b) International activities of NSF that stem from its responsibility, shared by each Federal agency, to render assistance within the executive branch of the Government toward the attainment of particular national goals to which the Foundation's resources and capabilities are relevant, herein called collateral activities.

A. Direct NSF International Activities

Included in this category are: (1) support of research activities in foreign institutions; (2) support of international cooperative research programs; (3) support in the United States of foreign related activities; and (4) foreign science information activities.

1. Support of research activities in foreign institutions.—Research support through grants to foreign institutions is administered as outlined above. Table I (col. A) shows the total dollar amounts of such obligations for fiscal year 1962 through fiscal year 1966 (estimated). Although Foundation appropriations have included specific sums for the purchase of Public Law 480 moneys for science information activities, this is not the case for research. No specific sums within research budget items are indicated for subsequent use for purchases of excess currency funds. Disbursements under research obligations include a small amount in U.S.-owned excess foreign currencies. In column B are shown the Foundation's obligations less the amounts disbursed or to be disbursed in foreign currencies. In column C are given the amounts obligated to foreign institutions in the OECD countries, plus Australia, New Zealand, and South Africa.

TABLE I.—*NSF obligations for research supported in foreign institutions fiscal years 1962-66 (estimated)*¹

Fiscal year	Total	Total, less foreign currency disbursements	Total to OECD countries plus Australia, New Zealand, and South Africa
	(A)	(B)	(C)
1962-----	\$1,176,700	\$1,176,700	² \$844,500
1963-----	1,666,200	1,666,200	1,345,900
1964-----	499,870	487,662	321,500
1965-----	522,700	522,700	408,700
1966 (estimate)-----	600,000	583,000	500,000

¹ For details see attachment A.² Excluding \$107,500 to Japan, which was not then an OECD member. Including Japan the figure would be \$952,000.

2. *Support of international cooperative research programs.*—A number of major international cooperative research programs have been initiated following the IGY. These include the International Years of the Quiet Sun (IQSY), the upper mantle program (UMP), the International Indian Ocean Expedition (IIOE), the United States-Japan cooperative science program, the world magnetic survey (WMS), the International Hydrological Decade (IHD)—which began in 1965, and the international biological program (IBP)—to start in 1966 or 1967. There will soon be a program on international cooperation in the atmospheric sciences, and most certainly other such international cooperative research programs will follow. Estimated obligations for international cooperative research programs for fiscal year 1963-65 are shown in attachment B. It should be understood that these funds are, with rare exceptions, made available to participating U.S. institutions for the conduct of their part of the total effort.

Most international research programs are planned by international scientific unions, and most U.S. relations with the international unions are through the adherence of the National Academy of Sciences to these bodies.

Although it is not an international cooperative program in quite the same sense as those indicated above, the National Science Foundation's Antarctic program should be mentioned here. Its significance lies in the fact that it involves international cooperation of a high order. The Antarctic Treaty is a significant "first" in designating a large area on the earth's surface as an area of scientific exploration and experimentation, and in setting aside all national territorial claims in the area for a period of 30 years. This treaty has important implications for a possible treaty for outer space, and has other significant political implications, not the least of which is the possibility that scientific cooperation may contribute positively to political cooperation in the international sphere.

3. *Support to U.S. institutions for foreign science activities.*—The Foundation supports a variety of foreign related science activities through grants and contracts to U.S. institutions for research; for international aspects of science education activities; for support of meetings, conferences, and individual travel grants; and for studies and reports on the economic and manpower aspects of foreign science.¹

(a) *Support of research in U.S. institutions involving activities abroad*

Many NSF grants to institutions in the U.S. support functions that relate to research or other aspects of scientific work abroad. The Office of Antarctic Programs, the Division of Biological and Medical Sciences, the Division of Mathematical and Physical Sciences, and the Division of Social Sciences support activities in this category. Two outstanding examples of support to U.S. institutions for research activities that are carried out abroad by U.S. scientists are the Bermuda Biological Station and the Cerro Tololo Inter-American Observatory. Other typical examples include research in antarctic and tropical biology and in anthropology.

¹ A summary of such support for fiscal years 1963, 1964, and 1965 is shown in attachment B. It has not been possible to make and include in the summary a reliable estimate of foreign activities carried out via research grants to U.S. institutions.

(b) International aspects of science education activities

Among the Foundation's programs in science education, various activities have foreign aspects. In fiscal year 1965, for example, there were 4,993 NSF fellowships awarded to U.S. citizens, of which 247 provided for tenure at foreign institutions. Support was given to five U.S. institutions for field training of U.S. students in Mexico (anthropology), in France (geology), and in Central America (tropical biology). There were also grants to one Canadian and one Mexican institution for training of U.S. citizens in mathematics and physics, respectively. Support also was given to U.S. institutions and organizations to enable foreign scientists and science educators to participate in U.S. educational and training activities. This support in fiscal year 1965 included provision for 49 visitors to a like number of institutions under the senior foreign scientist fellowship program, and for 134 teacher-participants at NSF-sponsored teacher institutes. For teachers of U.S. children overseas, one institute was supported in Japan and one in Switzerland.

There has been much interest shown by foreign countries in NSF-sponsored course content development activities and in teacher training institutes. Representatives of course content study groups in this country have associated themselves with a variety of science education projects throughout the world—projects which have been modeled to a large extent after U.S. efforts. In addition to the considerable ferment in the most advanced countries, from which U.S. science education leaders have benefited a great deal, the developing countries have shown interest in these programs, and NSF has been asked to help in many ways in many parts of the world. Various NSF-supported high school science course materials have been translated into Spanish, Japanese, Chinese, Portuguese, Thai, Hebrew, Norwegian, Swedish, French, and other languages, and have been used as texts or resource materials in some 40 countries. Only minor NSF support has been given to these translations and that through institutions in this country. NSF has been able to support modest programs in developing countries with funds transferred from the Agency for International Development. These activities are discussed at length below under "Collateral International Activities."

(c) International conferences and meetings

Another activity of substantial benefit to the U.S. scientific community is the participation by foreign scientists in professional conferences in the United States and attendance by U.S. scientists at meetings abroad. Funds supplied by the NSF for conference support are often utilized in large proportion to permit the participation of foreign scientists whose expected contributions to the conference are judged essential in assuring maximum scientific benefit to the U.S. participants. During fiscal year 1965, approximately 600 grants for travel abroad were awarded to U.S. scientists, primarily for the purpose of attending international scientific meetings. Support was also provided in fiscal year 1965 to 70 young U.S. scientists to assist them to attend short-term advanced study institutes sponsored in Europe by the North Atlantic Treaty Organization (NATO). And, during the same fiscal year about \$245,000 was obligated on a quid pro quo basis for the exchange of scientists between the United States and the U.S.S.R. and other East European countries. Smaller exchanges were conducted with Latin American countries and with Japan (in addition to exchanges under the U.S.-Japan cooperative science program).

(d) International aspects of economic and manpower studies

In pursuit of its mission to plan the improvement of U.S. scientific resources, the Foundation conducts and supports economic and manpower studies, primarily upon U.S. scientific resources, but including foreign resources as well. It is attempting to obtain data on manpower, facilities, and funds devoted to scientific activities in all foreign countries and to analyze the impact of these activities on technology and economic growth. The Foundation has cooperated and participated in projects of the Organization for Economic Cooperation and Development to establish regionally accepted standards and methodology for the survey of national scientific resources and manpower. Studies of foreign scientific resources, completed and in process, include analyses of the U.S.S.R. and the East European countries, Communist China, Latin America, and the Arab countries.

4. *International aspects of science information activities.*—One fundamental aspect of the mission of the Foundation is to improve the availability to U.S. scientists of the results of worldwide scientific and technical research. The

so-called information explosion has created a difficult problem for many research scientists who desire to keep up with the literature in their own fields of specialization. This problem is compounded by the appearance of foreign scientific and technological literature which the U.S. scientists cannot read. About 50 percent of the world's scientific literature is written in languages other than English. One-third of this literature is produced in the U.S.S.R., Japan, and China. Of the 215,000 scientists reporting to the National Register of Scientific and Technical Personnel in 1962, only about 5 percent indicated some knowledge of Russian, about 1 percent of Japanese, and less than 1 percent of Chinese.

The National Science Foundation does not itself undertake translations of foreign language literature. The Foundation's programs in support of translation activities are carried out by scientific and academic institutions both in the United States and abroad. At present, domestic and foreign institutions are receiving funds in support of translation activities. The annual rate of obligations for the program is approximately \$2 million, of which about \$1 million is for domestic efforts and about \$1 million is used by the Treasury upon request by NSF for the purchase of foreign credits in Public Law 480 countries. Major emphasis is on the translation of current scientific and technological literature from languages in which U.S. scientists have little competence, such as Chinese, Japanese, Russian, and other East European languages. Rarely are the more familiar West European languages, such as German or French, translated with NSF support.

Under the authority of the Agricultural Trade Development and Assistance Act of 1954 (Public Law 480), as amended, the Foundation is coordinating on behalf of nine other U.S. Government agencies the administration of translation programs in three foreign countries: in Israel for the translation of Russian scientific literature, and in Poland and Yugoslavia for the translation of their primary scientific journals.

In July 1958, the Bureau of the Budget requested the National Science Foundation to present to the Congress on behalf of all interested Government agencies a prospective program for utilizing foreign currencies for the purpose of securing translations of foreign scientific literature in the countries where these funds have accrued. The Congress subsequently appropriated \$1,200,000 for the purchase of these currencies from the Treasury Department. In January 1959, an amendment to Executive Order 10560 assigned to the Foundation the responsibility for initiating a unified, coordinated program for meeting the requirements of the agencies of the executive branch for translations and other science information activities authorized under the law. Thus, the three projects indicated above were initiated and form a continuing program. Materials translated under this program are selected by Federal research scientists on the basis of the potential contribution to scientific knowledge in the various fields of research. At the present time the Atomic Energy Commission; the Federal Communications Commission; the Departments of Agriculture, Commerce, Treasury, Interior, Health, Education, and Welfare; the National Aeronautics and Space Administration; and the Smithsonian Institution participate in the program.

To date, the combined efforts of the programs in Israel, Poland, and Yugoslavia represent the translation and publication of approximately 300,000 pages of foreign scientific literature. At the present time, the translation of Russian material, which is done in Israel, comprises 65 percent of the total amount; Polish, 25 percent; and Yugoslav, 10 percent. The scope of the program has been gradually expanded to include not only straight translation activities, but also support for the publication of English editions of their primary journals; cooperative programs with American abstracting and indexing services; critical review papers; compilation of bibliographies; and preparation of guides to their scientific institutions and information systems. Material translated is made available widely to U.S. scientists by distribution of copies to libraries and through the Clearinghouse for Federal Scientific and Technical Information.

The translation program overseas is supplemental to and not competitive with the domestic translation program. Materials are selected on the basis that they are of high quality, but of lower priority than those included in the Foundation's regularly budgeted dollar appropriations for the support of domestic translation activities.

NSF staff have visited India, Pakistan, and the United Arab Republic to explore the possibility of establishing translation programs in these countries with Public Law 480 funds. The evidence of willing cooperation displayed in these countries has been most rewarding, and authority is now being sought from Congress for expansion of the NSF Public Law 480 translation program.

B. NSF "collateral" international activities

"Collateral" international scientific activities are those in which the NSF has the responsibility, shared by each Federal agency, to render assistance within the executive branch of the Government toward the attainment of particular national goals to which the Foundation's resources and capabilities are relevant. Although the Foundation's involvement in these activities may be directed toward promoting the progress of science, in the very broad sense of that expression, there is an important distinction in that policy and program decisions and their implementation are not primarily a Foundation responsibility.

1. *Science activities of international governmental organizations.*—The United States belongs to a number of international organizations that have scientific components: United Nations Educational, Scientific, and Cultural Organization (UNESCO); Organization for Economic Cooperation and Development (OECD); North Atlantic Treaty Organization (NATO); Organization of American States (OAS); Central Treaty Organization (Cento) (in an observer status) to name the more important ones.

At the request of the Department of State, NSF has been involved for several years in OECD scientific activities, principally in correlating the mutual interests of Federal and foreign agencies in projects under OECD auspices. NSF is increasingly involved in the activities of OECD and until recently furnished the U.S. representative to the OECD Committee on Scientific and Technical Personnel.

The Foundation staff interacts to a lesser extent with the Department of State in the scientific programs and plans of NATO, UNESCO, OAS, and Cento, although considerable liaison is maintained with the secretariats of these organizations, particularly with respect to the advanced training programs of NATO and science assistance programs of the others.

2. *NSF/AID science education activities.*—During the past few years the Foundation has received many requests from education leaders in developing countries for assistance in initiating science education reforms similar in nature to the major efforts underway in the United States. These requests have arisen from the association of foreign scientists and teachers with course content improvement activities and teacher-training institutes in the United States, as well as from the general appreciation throughout the world of the leadership that the Foundation has provided in encouraging innovation and improvement in the teaching of science and mathematics. The Foundation has provided advice and guidance for these activities, within the limits of staff time available; the staff advisory role of the Foundation, in some cases in conjunction with AID, in formulating science education programs in India, the Philippines, Taiwan, UNESCO, and Cento, are examples.

Discussions were initiated in 1960 between the Foundation and AID to explore systematic NSF involvement in science education activities in developing countries. Since then working relationships between NSF and AID have slowly developed, beginning with technical assistance to a teacher-training institute in Nigeria in 1962, and subsequently involving consultant and technical services for science education activities in Cento, India, and the Philippines. Formal cooperation began in 1963 with two Participating Agency Service Agreements which provided for NSF involvement in science education programs in Latin America and are continuing at the present time under an NSF-AID General Agreement signed in December 1965. Under the general agreement, the necessary mechanism is in existence for further cooperation in whatever ways both agencies agree would be desirable. The fiscal level of these AID financed activities over the past 3 fiscal years is indicated in attachment B.

IV. CONCLUDING REMARKS

In the preceding discussion, we have attempted to present information that covers the subcommittee's interest in Foundation obligations for research to foreign institutions, particularly those in the developed countries. We also have indicated the statutory authorities under which such projects and programs are supported. Executive branch policies as well as NSF policies that lend further guidance to the Foundation's support of foreign research have been indicated. Going beyond the subcommittee's expressed interest in foreign research, we have reviewed the Foundation's total international scientific effort in order that the subcommittee have the benefit of this broader context within which to understand better the foreign research effort.

With reference to the subcommittee's question regarding the awareness of the Congress to these activities, the Foundation keeps the Congress informed in a variety of ways. For example, as grants and contracts are effected on a daily basis, a listing by geographic location of the recipient is distributed to interested members of the House and Senate. This listing is presently distributed as follows:

- A. Members of the House Science and Astronautics Committee;
- B. Members of the Independent Offices Subcommittee of the House Committee on Appropriations;
- C. Chairman of the Subcommittee on Research and Technical Programs of the House Committee on Government Operations;
- D. Fifteen Members of the House who have requested the listing;
- E. Members of the Subcommittee on Independent Offices of the Senate Committee on Appropriations;
- F. Members of the Senate Labor and Public Welfare Committee;
- G. Eleven Members of the Senate who have requested the listing.

In addition, the Foundation's annual budget presentation to the Congress includes as attachment A a listing of specific grant, contract, and fellowship awards made in the preceding fiscal year, arranged by State and foreign country and by name of institution. The Foundation's annual report, submitted each year to the President for further transmittal to the Congress, also carries such listings, including brief titles of projects that are supported. Lastly, the Foundation responds throughout the year to specific requests for information regarding its programs and projects from interested Members of the Congress.

With reference to the subcommittee's question regarding measures that might be taken by the Foundation to reduce the amounts obligated for foreign research grants and contracts, it should be noted that the Foundation's programs in this regard have resulted in the past 2 fiscal years in lesser obligations than the maximum ceiling imposed by the Bureau of the Budget for this activity. The Foundation will continue to examine critically all requests for research support from foreign institutions and fund only those that meet the stringent criteria under which we are now operating.

ATTACHMENT A

National Science Foundation obligations for research to foreign institutions, by country: fiscal year 1962-66 (estimated)

	Fiscal year 1962 actual	Fiscal year 1963 actual	Fiscal year 1964 actual	Fiscal year 1965 actual	Fiscal year 1966 estimated	5-year total
Afghanistan.....		\$20,000				\$20,000
Argentina.....	\$60,800			\$14,900		75,700
Australia ¹	192,400	508,100	\$170,700	111,300	\$107,500	1,090,000
Belgium ¹		79,100	25,000	20,000		124,100
Bolivia.....		97,600				97,600
Canada ¹	113,100	219,700	30,500	194,700	178,500	736,500
Chile.....		13,500				13,500
Colombia.....	16,100					16,100
Costa Rica.....	2,500	15,000				17,500
Ethiopia.....			11,200			11,200
France ¹	21,700		78,800			100,500
Germany ¹	28,000					28,000
Iceland ¹		8,400		32,900	14,000	55,300
Indonesia.....	9,500					9,500
Israel.....	65,000	35,000	25,000	40,000	20,000	185,000
Italy ¹	277,900	200,000		20,000		497,900
Jamaica.....		1,400				1,400
Japan ¹	107,500			2,000		109,500
Kenya.....		48,400			31,800	80,200
Lebanon.....		28,800	24,600			53,400
Mexico.....	27,500			31,500		59,000
Netherlands ¹	2,100					2,100
New Zealand ¹	29,600	19,900		2,800		52,300
Nigeria.....	22,000	60,600	6,250	27,600		116,450
Peru.....	19,000					19,000
Philippines.....			55,200			55,200
Rhodesia.....	2,300		41,120			43,420
Sweden ¹	120,000	30,000				150,000
Switzerland ¹			7,000			7,000
Tanzania.....			15,000			15,000
United Kingdom ¹	59,700	280,700	9,500	25,000	2,100	377,000
Total.....	1,176,700	1,666,200	499,870	522,700	² 600,000	4,465,470
Total, less Public Law 450.....	1,176,700	1,666,200	487,662	522,700	583,000	4,436,262
Total selected coun- tries ¹	844,500	1,345,900	321,500	408,700	² 500,000	³ 3,420,600

¹ OECD countries (exclusive of the United States) including Japan in fiscal year 1965 and later, Australia, New Zealand, and South Africa, excluding Japan in fiscal year 1964 and earlier.

² Detail is composed of awards made through the 1st half of fiscal year 1966 and does not add to total, which is an estimated total for the full fiscal year.

³ Including estimate of obligations for 2d half of fiscal year 1966; sum of detail is less than total shown.

ATTACHMENT B

*Support of foreign and international activities, fiscal years 1963, 1964, and 1965*¹

	Fiscal year 1963	Fiscal year 1964	Fiscal year 1965
A. Support to U.S. institutions:			
International research programs.....	\$12,504,862	\$16,383,409	\$15,474,633
National research centers abroad.....	1,000,000	1,000,000	1,385,000
Visiting scientists and educators.....	1,143,016	1,117,533	880,807
Science information support.....	2,071,807	1,889,745	1,206,880
Science resources studies.....	102,043	34,960	122,000
Subtotal.....	16,821,728	20,425,647	19,069,120
B. Support for individuals:			
NSF fellows abroad (U.S. nationals).....	2,237,845	2,002,214	2,191,518
Travel grants to U.S. scientists.....	489,258	451,113	439,002
East European exchanges ²	260,100	234,622	244,813
Other exchanges.....		5,200	
Subtotal.....	2,987,203	2,693,149	2,875,333
Total NSF funds.....	19,808,931	23,118,796	21,944,453
C. Collateral programs:			
Fellowships (financed by NATO and OECD).....	336,031	457,429	425,775
Science information translations (Public Law 430).....	1,555,760	1,556,800	1,840,000
Science assistance (financed by AID).....	80,579	374,437	658,958
Subtotal.....	1,972,370	2,388,666	2,924,733
Grand total.....	21,781,301	25,507,462	24,869,186

¹ Totals shown in attachment B are composites, estimated from various programs as contributive to the functions indicated in the table. Therefore, the totals shown may differ from other figures available in sources such as "Federal Funds for Science," the NSF annual report, etc. Research support to foreign institutions shown in attachment A is not included in the totals.

² Funded on a reciprocal basis in which cost of transit is paid by the home country and costs within the country visited are paid by host country.

Mr. REUSS. Here is a project of \$27,600 to the University of Nigeria to conduct an archeological survey in the eastern region of Nigeria.

Here is one for \$32,900 to Iceland, to conduct a study of the life cycle of the ptarmigan, a partridge-like Icelandic bird.

Here is one to a Londoner, \$25,000 for a study of molecular biology.

Here is one to a scientist at the University of Adelaide, Australia, \$11,300 for regulatory biology.

Here is another for \$13,500 to the University of Alberta, Canada, for a mathematical analysis of raw data collected in east Africa.

Here is one for the University of Montreal, \$30,000 for psycho-biology.

Here is another to McGill University, Canada, \$48,500 for psycho-biology.

Here is a similar one to the University of Toronto for psycho-biology, \$27,800.

Would you, Dr. Wilson, address yourself to the essentiality of these projects to the national interest and the mission of the National Science Foundation in improving science in the United States. Please also justify these projects in terms of the balance-of-payments crisis, whether these were essential or whether they could have been accomplished by someone in the United States, and whether postponing them for a year or two pending improvement in our balance-of-payments crisis would not have been more in the national interest.

Dr. WILSON. Yes, Mr. Chairman.

(The NSF grant justifications follow:)

Nigeria, University of Nigeria, anthropology, \$27,600

Africa is the probable site of the earliest human societies and the archeological record appears longer there than on any other continent. This grant provided funds for an archeological survey, including test excavations, of the cultural development in the eastern region of Nigeria. The principal investigator is a U.S. citizen. At the time the grant was made, he was associated with the University of Nigeria.

Iceland, Museum of Natural History, environmental biology, \$32,900

The research supported by this grant is an outgrowth of the interest of the U.S. State Department's Office of Cultural Exchange in developing better relationships between the United States and Iceland. That Office sent an outstanding U.S. ecologist of the University of California at Berkeley, to Iceland in the summer of 1962 to ascertain what could be done to strengthen certain phases of biological research in that country. Upon examination of the local situation, he recommended the implementation of an accelerated research program on the ptarmigan cyclic phenomenon, which is directly related to one of the most interesting and complex areas of research in ecology—the mechanisms which control population numbers, and the influences which cause buildups and declines in natural populations. The research assistant on the project is presently a graduate student at the University of California, Berkeley.

United Kingdom, St. Mary's Hospital Medical School, molecular biology, \$25,000

Funds under this grant support research on gamma globulins, which are important antibody-bearing proteins of the blood responsible for conferring immunities to various diseases. The principal investigator has conducted the pioneer research on gamma globulin. A combination of his preeminence and the crucial importance of this field of biological science was the basis for making the grant to St. Mary's Hospital. He has trained many U.S. scientists in his laboratory, and they in turn have come back to this country to train more scientists in the field of immunology.

Australia, University of Adelaide, regulatory biology, \$11,300

This project is directed at a fundamental problem of plant hormone action in relation to the regulation of plant growth; it involves one of the very few systems available in higher plants where a direct approach can be made to the problem of growth at a molecular level. The University of Adelaide has the outstanding laboratory in Australia engaged in physiology and biochemistry of plant growth hormones. It serves as a very important center for U.S. scientists, especially for research on plants indigenous to a relatively isolated part of the world. The chief investigator is an American citizen.

Canada, University of Alberta, psychobiology, \$13,500

This grant is in support of mathematical analysis of raw data collected in east Africa (under a previous NSF grant) on primate behavior. The chief investigators are U.S. citizens. They combine in an almost unique sense mathematical and zoological competence and research interests. The work being supported is of direct relevance to current scientific interests in higher level primates.

Canada, University of Montreal, psychobiology, \$30,000

The research under this grant makes use of advanced techniques in electrophysiology to study neural activities in the brain as these relate to the assimilation and processing of information received through the sense organs. The principal investigator is a citizen of the United States and is a distinguished scientist in the fields of the physiology, morphology, and chemistry of the brain. His work is internationally recognized, and NSF has been supporting his research for the past 10 years. A high proportion (if not the majority) of his graduate students come from and return to the United States.

Canada, McGill University, psychobiology, \$48,500

This project in the field of brain research investigates neural mechanisms in the brain in relationship to specific forms of learning. A U.S. citizen has been the director of the psychology laboratory at McGill University for the past 20 years, and is a recognized authority in his field. Six of his current graduate

students are U.S. citizens and a high proportion of his past graduate trainees have been U.S. citizens now working in U.S. colleges and universities.

Canada, University of Toronto, psychobiology, \$27,800

This research project is primarily concerned with the learning and memory processes in individuals who are bilingual. A major phase of the investigation is made possible because of the availability of the large Estonian population in Toronto. (More Estonians live in Toronto than anywhere else outside of Estonia.) The principal investigator, a Canadian citizen, is a (if not the) leading research worker in this area of language development and usage. About a quarter of the graduate students in his department are from the United States.

Dr. WILSON. As you and your committee members know, one of the functions of the National Science Foundation is to support academic-type or basic research, as it is sometimes called, across the whole field of science.

In carrying out this function, a basic policy of the Foundation is that whatever we do domestically or internationally is supposed to benefit science in the United States. Within the general policy that I have just stated, we also function within the same administrative policies that have been referred to by Dr. Shannon; that is, those laid down by FCST, and our own internal policies with respect to no indirect costs and supporting only the very top scientists and that sort of thing.

Within this general frame of reference we justify our international research projects on bases such as these: No. 1, for example, in supporting foreign scientists we are supporting what we hope or believe to be, on the basis of best judgment, very top-level scientists within the world community of science in a given field.

No. 2, in the event of support, it usually is a laboratory to which U.S. scientists go particularly for postdoctoral training. It may also be a place that has some geographic uniqueness to it without which the research could not be done. These are the type of criteria I am speaking about within our general frame of reference.

Mr. REUSS. I did ask you about specific cases because, of course, we all agree with the "God is just" kind of analysis.

What about \$27,600 for an archeological survey of the eastern region of Nigeria? Why shouldn't the archeologist finance himself or why shouldn't Nigeria finance it, or what steps did you take to make sure there were no scientific projects in the United States which wouldn't have a balance-of-payments impact of a greater importance than this one to our national interest in time of balance-of-payments crisis?

Dr. WILSON. I would say with specific respect to support of Dr. Hartle at the time he was at the University of Nigeria, first of all, he is a U.S. scientist who happened to be spending a year at the University of Nigeria.

Mr. REUSS. True, but in terms of the balance-of-payments impact, his U.S. citizenship does not sweeten the pot.

Dr. WILSON. That is correct, but with respect to the policies we are operating under in the Foundation, we attempt to support U.S. citizens doing first-rate research in competition with other U.S. citizens, whether they are abroad or here.

Mr. DICKINSON. Just a minute. Will you make that last statement again?

Dr. WILSON. We attempt to apply the same criteria with respect to accepting proposals from U.S. citizens who are seeking support from the Foundation as we would whether they are abroad or in the United States; we, then, apply foreign support criteria to the project they might want to do.

Mr. DICKINSON. You said in competition and I was wondering what you mean there. I didn't understand that.

Dr. WILSON. Well, proposals come into the Foundation in great numbers, primarily from U.S. citizens; that is, scientists in the United States, and they are evaluated in essentially the same procedure that Dr. Shannon described. We have advisory panels of scientists from the university community and in that sense proposals compete with each other for extremely limited funds. And it is in the sense that a U.S. citizen is considered to be a U.S. citizen whether he happens to be located for a particular year at the University of Nigeria or the University of California.

Now, in addition to his right, his status in the competition as a function of being a U.S. citizen, if he wishes to be supported as in this case at the University of Nigeria, we would look at what he wanted to do and ask a question as to whether or not this must be done there or what peculiarity is there in this situation that would warrant him to be supported there.

In this particular case this part of the world in Africa happens to be terribly important in terms of cultural history. He happens to be an anthropologist who had a leave of absence from his normal university and took advantage of it to do research in a particular geographic area where the diggings are located. You can't dig for artifacts of the cultural development in the world that happen to be in Nigeria in Arizona. They are just not there. And that is the kind of justification—

Mr. DICKINSON. I can figure that out myself.

Dr. WILSON (continuing). justification for this particular case.

Mr. DICKINSON. Do you say, then, that you have so many applications for these grants, Government-financed studies that they must compete among themselves for the amount of money available?

Dr. WILSON. Right.

Mr. DICKINSON. And you have a board that selects which will be accepted and which will not.

Dr. WILSON. We have a series of panels in different areas of science that study the proposals that are submitted to the Foundation, yes, and they make recommendations through program directors, as we call them, and the power of giving or not lies with the National Science Board. It happens for grants of this size that the authority is delegated to the Director of the Foundation and to me as Deputy Director. So that the Nigerian—

Mr. ST GERMAIN. Excuse me, Doctor. In answer to one of the questions you used the term "extremely limited funds." Can you be specific and give the amount of these funds?

Dr. WILSON. There are two different measures you are interested in in asking such a question. The number of proposals that are supported out of a given population of proposals and the dollar level of support that is possible. At the moment the Foundation is operat-

ing with funds which allow it to support approximately 50 percent of the applications that come to it.

Mr. ST GERMAIN. Would you cite the number; 50 percent of what?

Dr. WILSON. I will have to do it from memory. I believe last year we supported something in the neighborhood of 3,000-plus academic-type grants out of over 6,000 proposals to us for research support. In terms of amount of dollar support, we are operating somewhere near the level of 30 to 33 percent of the dollar request each fiscal year.

Mr. ST GERMAIN. What is the dollar request, then?

Dr. WILSON. Those figures I don't have off the top of my head but—

Mr. ST GERMAIN. What fund do you have available? Let us put it that way.

Dr. WILSON. That is what I was—

Mr. ST GERMAIN. You see, you used the term "extremely limited funds" and that is why I am interested in how limited these are.

Dr. WILSON. The "extremely limited" phrase had to do with the one-third dollar level support. I can give you the specific dollars but I will have to look in my pocket.

Mr. ST GERMAIN. All right. Fine.

Dr. WILSON. I just don't recall how much it is. For fiscal 1966 the Foundation's support of basic research project grants of the kind we are now speaking about will be at the level of approximately \$160 million. So that my guess is that the total proposal pressure expressed in dollar terms will be over three times that much. Closer to four times that much probably.

Coming back to the list of projects Chairman Reuss was referring to, one of the things in supporting a foreign scientist that we insist upon is that he indeed be one of the leaders in the particular field of science which is being supported. In the case of the grant to Dr. Porter, St. Mary's Hospital, London, I believe anyone who is working in the field of gamma globulins and immunology would say that he is indeed one of the top—I don't know what percent—2 or 3 percent of the people working in this particular field.

His laboratory is a place to which senior scientists at postdoctoral level go to work. It is on that basis that the grant to his laboratory was made.

You mentioned several grants to Canada. I would like to make two or three general points about Canada. The interaction between the Canadian scientific community and the scientific community of the United States is a very active one. Many U.S. citizens have faculty position in universities in Canada and many U.S. predoctoral candidates go to Canada to get their training. In almost every instance the support that you referred to was to U.S. citizens and in most laboratories there are U.S. students working.

Now, the pattern of interaction between the Canadian and U.S. scientific community is such that the exchange of individuals at the faculty level is relatively great. We certainly, in the history of the exchange, have been the winners in terms of the drain. In most of these instances U.S. citizens serving on the faculties of universities in Canada within a period of 5 years will return to the United States and be a member of a U.S. faculty. So that in this sense there is a special characteristic about interaction with Canadian universities.

In the particular cases that you asked about, the support to Dr. and Mrs. Altman, again who are U.S. citizens, is due to the fact that in addition, to being U.S. citizens, they are a pair that are rather unique. They represent a unique combination of mathematical ability and zoological ability. The state of science in their area is such that there is a great deal of interest in the breeding of primates in the way primates rear their young, the survival value of primates and that sort of thing. That was the content of their field work and the grant to the University of Alberta was made after they returned from their field-work for the purpose of doing computer analyses, as I remember, of the field data which they gathered.

It is my recollection that Dr. and Mrs. Altman are now down at Emory University in Georgia, on the faculty of Emory University.

Mr. REUSS. Would the National Science Foundation have collapsed if it deferred the grant to the Altmans until they went to work at Emory University, and hence that their study of east African primates would have been delayed by a year or two?

Dr. WILSON. No; the National Science Foundation wouldn't have collapsed.

Mr. REUSS. Would it have hurt our national interest?

Dr. WILSON. I don't know what the circumstance was that led to the change of university from the University of Alberta to Emory, but I would not at all be surprised if the fact that the National Science Foundation chose to support the work of the Altmans made Emory University considerably interested in them. It certainly could be related. I don't know whether it was or not.

Dr. SHANNON. Mr. Reuss, I can add to that. The reason they went to Emory and were considered to be very valuable for that purpose, or for the purposes of Emory, is that the National Institutes of Health made a substantial grant to Emory University to establish a primate center. And I would say that were it not for this prior experience overseas and the subsequent studies in Canada, Emory University would not have a fully prepared scientist to undertake this activity. The establishment of a limited number of primate centers throughout the United States under grants from the National Institutes of Health has been considered as one of the very essential elements of further progress in the biomedical sciences.

Mr. REUSS. This establishes, gentlemen, that you can help the study of primates in east Africa, which is important, without balance-of-payments impact by giving the grant to Emory University. You did that, didn't you?

Dr. SHANNON. No, sir.

Mr. REUSS. I misunderstood you, then.

Dr. SHANNON. The handling of primates in the wild and the handling of primates in a caged colony present quite different problems and as one develops the need for more species of primates, it becomes more important, particularly if one is going to deal with breeding in the caged situation, to know much more about reproduction of these animals than one can find out in a restricted situation.

Mr. REUSS. What was this grant that you gave to Emory University?

Dr. SHANNON. To establish a primate center.

Mr. REUSS. At Emory?

Dr. SHANNON. Yes, sir.

Mr. REUSS. In Atlanta?

Dr. SHANNON. Yes, sir.

Mr. REUSS. That has no balance-of-payments impact?

Dr. SHANNON. No, sir.

Mr. REUSS. That is great. What I am——

Dr. SHANNON. The point I——

Mr. REUSS. My point is, Why don't you help the study of east African primates in America by making grants to Emory University, as you did, at a time of our balance-of-payments crisis rather than making grants to somebody who is later going to be brain drained back to Emory University from Canada? He might have returned sooner if you hadn't subsidized him in Canada. Have you thought that one out? Dr. Wilson?

Dr. SHANNON. The point I am making, Mr. Reuss, is that he would not be a valuable addition to the Emory staff for purposes of developing this primate center had he not had this overseas experience.

Mr. REUSS. By overseas you mean in Canada?

Dr. WILSON. In Africa.

Dr. SHANNON. In Africa.

Mr. REUSS. Yes, but you weren't paying him for his work in Africa. You were paying him for his work in Canada based on the work he had done in Africa.

Dr. WILSON. In the information we furnished to the committee we went beyond the question of the immediate grant and indicated to the committee in a parenthetical statement that we had indeed supported Dr. and Mrs. Altman in their east African work, also. They are that quality scientist. I was wanting to tell you the whole story. In the piece of information we furnished the staff, the sentence reads:

This grant is in support of mathematical analysis of raw data collected in east Africa—under previous NSF grant.

Mr. REUSS. I applaud that "previous NSF grant" if it was made before we ran into balance-of-payments trouble because I am for supporting science all over the world, but what we are talking about this morning is balance of payments and I wish I could get you to address yourself to the question of whether it makes good balance-of-payments sense to pay somebody up in Canada at a time when we have, I am told, in Emory University an excellent primate center right here in the United States. Why not give Emory an extra \$13,500?

Dr. WILSON. At that time the Altmans were not down at Emory. They were in Canada. And on the point that you asked, if the Altmans ask for another grant or continuing grant, I feel rather certain we will give them another grant at Emory University.

Mr. REUSS. Which we will applaud.

Mr. ST GERMAIN. Mr. Chairman, I wonder, is this the famous monkey center that we discuss on the floor of the House every year when the HEW appropriation is before the body?

Dr. WILSON. I don't know.

Mr. REUSS. I don't know whether it is or not.

Mr. ST GERMAIN. Is there more than one primate center in the country?

Dr. WILSON. In the United States there is more than one, yes.

Mr. ST GERMAIN. One that in particular has been going 5, 6, or 7 years attempting to study the social relationships, man and wife relationships, of primates? I ask one of the representatives from HEW to comment on that because I am sure that you people are familiar with it.

Dr. SHANNON. That is the primate center at the University of Wisconsin.

Mr. REUSS. A great place.

Mr. ST GERMAIN. How long has that been going on?

Dr. SHANNON. Approximately 5 years.

Mr. ST GERMAIN. Have we learned anything yet? Do we yet know if these boys and girls get along together?

Dr. SHANNON. Indeed we do. If you would like a summary of that, I would be glad to prepare it for the committee.

Mr. ST GERMAIN. I would appreciate that if the gentleman would. (The information referred to is as follows:)

DIVISION OF RESEARCH FACILITIES AND RESOURCES

Title of project: Operation of the Wisconsin Regional Primate Research Center.
Principal investigator: Alberty, Robert A. Dean, Graduate School, University of Wisconsin.

Coinvestigator: Harlow, Harry F.

Institution: The University of Wisconsin, Madison, Wis.

Background information.—The Wisconsin Regional Primate Research Center, one of seven primate research centers being established throughout the United States by the National Institutes of Health, became fully operational in the summer of 1964. The new facilities were provided by a nonmatching construction grant of \$1,297,000 and consist of a four-story research facility on the Madison campus of the University of Wisconsin and a two-story primate conditioning and holding facility at the Madison Vilas Park Zoo. A portion of the university's psychology department primate laboratory, which is adjacent to the center, is also used for some research activities.

The Primate Research Center is an interdisciplinary institute administered by the dean of the graduate school who serves as principal investigator. Most of the center's scientific program is funded by an operational grant from the animal resources branch, DRFR, which is negotiated annually.

The research program of the center is organized into five behavioral and four biomedical research units served by a common pool of administrative and technical personnel. The effects of psychoactive drugs on discrimination and complex behavior, biochemical products of learning and stress, experimental induction of phenylketonuria, fetal neurochemistry, and renal physiology, hormonal requirements for the maintenance of pregnancy, central nervous system control of gonadotropin release, tumor induction by carcinogenic agents, effects of total body x-irradiation and radioprotective agents, ultrastructural changes in the cellular organelles of the liver and cardiovascular system, low-level toxicity studies, and effects of bone marrow transplants following irradiation.

In addition to the scientific program of the core staff and the evolving visiting scientist program, regional collaborating activities of the center include providing primate tissues to investigators at other institutions, dissemination of information about primate facilities and animal care procedures, and providing facilities or special primate research materials to scientists from other institutions on short-term visits to the center.

Dr. Harry F. Harlow is the center director and Dr. John W. Davenport serves as his assistant.

The nine research units and the responsible project supervisor for each are:

Unit and senior staff member

Physiology-endocrinology, Dr. R. K. Meyer.
 Pediatric-biochemistry, Dr. H. A. Waisman.
 Experimental pathology, Dr. J. L. Van Lancker.
 Primate medicine, Dr. J. R. Allen.
 Social psychology, Dr. H. F. Harlow.
 Psychology-learning, Dr. J. W. Davenport.
 Psychochemistry, Dr. R. E. Bowman.
 Psychopharmacology, Dr. V. J. Polidora.
 Psychophysiology, Dr. J. S. Schwartzbaum.

Specific areas of research now include the development of affectional systems in the social behavior of macaques, effects of brain lesions in early infancy on learning capacity and social behavior, comparative studies of operant conditioning in various primate species, emotional conditioning processes in learning.

Resources and facilities.—It is apparent that the Wisconsin Regional Primate Research Center is now an actively functioning organization. The laboratories are well equipped, the major research units are staffed, and research projects are being vigorously pursued. The equipment on hand seems to represent items currently in use; the major items required for the various research are available, and the animal facilities are well organized and efficiently managed. The professional staff is composed of highly competent investigators of excellent reputation. The scientific program is weighted in the direction of psychological research which is the area in which the majority of the professional personnel have the greatest competence.

Physiology-endocrinology unit.—No supplemental funds are requested for this unit. This is due in part to the availability of funds from other grants and in part to the limitation of space devoted to this activity.

The close correlation existing between the functions of the nervous and endocrine systems makes it imperative that these studies be pursued. The work underway appears to have merit, but in some respects is so closely aligned with psychological studies as to seem service oriented.

Pediatric-biochemistry unit.—This unit is under the direction of Dr. Harry A. Waisman, professor of pediatrics, who has an excellent background in biochemistry and has made outstanding contributions in studies of inborn errors of amino acid metabolism in humans. He has recently published his work on experimental simulation in rats and monkeys of related metabolic diseases. This work is of great potential significance, not only because of the importance of the human diseases, but also for the promising contributions to basic biochemical problems. The studies of phenylalanine effects in infant monkeys were recently published in *Science* (147:685, Feb. 1965). The observation that feeding of excess histidine causes hyperlipemia may be a major contribution to this extremely important and poorly understood phenomenon.

Experimental pathology.—The work of this group is under the direction of Dr. J. L. Van Lancker who is an Associate Professor of Pathology and a Career Awardee of the Public Health Service. He is well qualified as a pathologist and experienced in studies on anatomic effects of x-irradiation. His assistants, Drs. J. R. Allen and H. McClure, who work with him are both well trained in veterinary and comparative pathology.

The service function of this unit is to perform post-mortem examinations on all animals that die at the center. Adequate gross dissecting areas and histologic preparation facilities are available. Complete gross and microscopic examinations are carried out, and acceptable records are kept. No routine microbiological, parasitological or blood chemistry studies are being done; however, some minimal effort in this direction should be initiated.

Research studies have been conducted on protective effects of bone marrow transplants in irradiated monkeys. Other studies are being carried out on the biochemical effects of x-irradiation on regenerating liver. A number of papers have been published on this general area by Drs. Van Lancker, Fausto and McClure.

Primate medicine unit.—This unit, under the supervision of Dr. J. R. Allen, provides for the animal health programs and is actively engaged in a productive research program. Drs. Chapman and Siegfried provide professional assistance to Dr. Allen; all are graduate veterinarians.

The main species of primates at the center is the rhesus monkey, usually purchased as sexually mature animals weighing 6 to 7 kilograms. Newly arrived monkeys are housed in the holding facility located at the Vilas Park Zoo where they remain for a minimum period of 90 days during which time they are TB tested a minimum of three times. The first 2 weeks are isolation during which time they are X-rayed and hematocrit and hemoglobin determinations are made. Quarantine and holding facilities are being improved by minor construction changes being made in this, as yet, uncompleted structure.

The scope of the research program being conducted by Dr. Allen and his coworkers as well as their ability to carry it out was most impressive. A completed experiment on the effect of environmental stress on three groups of a total of 150 monkeys exposed to the physical and environmental stress of shipment, then maintained in quarantine for 90 days was of interest. Complete blood studies, total serum protein and electrophoretic patterns were obtained three times during the 90-day test period. Stool cultures were performed on each monkey for the presence of *Salmonella* or *Shigella* organisms. It was found that a period of at least 90 days was required to establish normal blood values. Baseline data of this type are very valuable at the present stage of primatological knowledge.

Other programs currently under investigation by this unit include:

(a) Irradiation studies: This is a study of the development and course of secondary disease in monkeys receiving total body x-irradiation and bone marrow transplants.

(b) Cardiovascular studies: This project concerns the production of cardiac lesions in monkeys fed certain "toxic" fats which have been shown to produce hydropericardium and ascites in experimental animals. Ultramicroscopic changes were observed in the heart and liver along with a complete description of the general architecture of the myocardium.

Social Psychology Unit.—This unit is under the direction of Dr. Harry F. Harlow, Professor of Psychology and Director of the Wisconsin Regional Primate Research Center. At present Dr. Harlow's behavioral investigation includes two programs:

(a) The first involves effects of neocortical lesions on learning and intellectual abilities in monkeys. The discovery that intellectual loss after bilateral destruction of the frontal associative system is greater in older monkeys than in infants justifies the continuance of the program. Producing increasingly larger lesions in infantile monkeys, as is proposed, and comparing the performance of these monkeys with that of normal subjects will help elucidate the nature of the cortical maturational process underlying intellectual capabilities.

(b) The second program involves testing the learning ability and social interactions of monkeys which have (induced) simulated inborn errors of human metabolism. This program is in conjunction with studies by Drs. Waisman and Kerr of the Pediatric-Biochemistry Unit. The problem is to determine the extent to which these "biochemical lesions" cause deficiencies in learning ability and varied social interactions. Such testing has been extremely difficult in the past because of the devastating effects of the diet on the subject. New procedures, especially the delivery of infants to mothers fed on amino acid diets, now make such testing possible, and preliminary results are promising.

Psychology-learning unit.—The unit chief is Dr. John W. Davenport, assistant center director, who has recently been promoted to associate professor of the University of Wisconsin Psychology Department. The work accomplished this far has been primarily of a methodological and parametric nature. Considerable information has been gathered on the effects of a number of learning and reinforcement variables on performance of rhesus, stump-tailed and squirrel monkeys in operant and discrete trial learning contexts. Of major interest is the work on discrete trial versions of standard Skinnerian reinforcement schedules. Some of the research has involved comparison of the performance of rats and monkeys tested simultaneously in similar training situations. As yet, this work has not been brought together in coherent form, but several major publications are planned.

A major research effort will be directed toward "primate psychotherapy." Dr. Davenport proposes to study the value of counter-conditioning techniques for the elimination of conditioned fear. Current work related to this project involves classical (Pavlovian) conditioning, a major class of learning largely neglected in the primate.

Psychochemistry unit.—The unit chief is Dr. Robert E. Bowman who has been conducting purely behavioral as well as psychochemical studies. A number of the latter have been done in close collaboration with Dr. Richard C. Wolf of the endocrinology unit. The research on behavioral-biochemical relationships consists of two major problems. One is concerned with measurement of adrenocortical steroid output resulting from various stress-inducing procedures, including social isolation and aversive conditioning. Dr. Bowman will make use of a technique he has developed for measurement of plasma cortisol as 17-hydroxy corticosteroids in monkeys.

The second major problem is concerned with brain nucleic acid metabolism in relation to learning. Thus far, the work on this project has been concerned primarily with development of reliable methods for assay of RNA and DNA.

Dr. Bowman's behavioral studies involve description and measurement of systematic response tendencies (hypothesis behavior) during object-discrimination learning set formation.

He is also interested in studying visual exploration by monkeys for sustained periods of time under home-cage conditions. Techniques for automatic recording of this exploratory behavior are currently being developed.

Psychopharmacology unit.—The unit chief is Dr. V. J. Polidora who also has an academic appointment of assistant professor in the university psychology department. He is interested in drugs primarily as a means of clarifying biochemical-behavioral relationships.

One of his major projects is concerned with the stimulus correlates of visual pattern discrimination. The studies are carried out in a highly automated discrimination learning apparatus (WATA) in which the programing and recording functions are done on an IBM key punch. He has now isolated the stimulus dimensions of his metric visual patterns which account for most of the discriminability.

He plans to use this information to study interactions between effects of complexity of discrimination learning problems and effects of pharmacological agents. He also plans to utilize the information on metric visual patterns to study learning set formation as a function of problem difficulty and to study aspects of matching-to-sample learning.

Another major program involves sequential response learning. Dr. Polidora has established the rates and limits of such learning in rats and has gone on to determine the dose response and duration sequences. Similar experiments on primates have been initiated.

Another program is concerned with visual signal-from-noise detection in primates and the effects of drug dosages on detectability of signals.

Psychophysiology unit.—The present program is adequately funded through the 05 grant year, and the experimental program being pursued by Drs. Harlow and Schwartzbaum is considered to be excellent. The supplemental funds requested for 06 through 10 are based principally on the need for an additional senior staff appointment for potential correlates in the behavioral program dealing with affectional perceptual and learning measures. The strength of the present program is in the excellence of its behavioral measures in animals with brain lesions; adding this new aspect of research greatly widens the scope of the program.

However the type of correlates to be sought, part of the brain to be studied, and other basic program elements have not been detailed in the application. Such specifics would depend on the interests of the individual accepting this position. The justification of the request is, therefore, primarily based on the individual to be hired at a later date and not identified at this time. In general, the equipment estimates are considered high for conventional neurophysiology studies, but inadequate for satisfactory multichannel recording on magnetic tape, conversion of data to digital form, programing and computer analysis.

Members of the Advisory Committee on Primate Research Centers participating in site visit:

Dr. Donald B. Hackel (chairman) (Ad Hoc Advisory Committee member), professor of pathology, Duke University Medical Center, Durham, N.C.

Dr. Allan M. Schrier, psychology department, Brown University, Providence, R.I.

Dr. Irvén DeVore, assistant professor of anthropology, department of anthropology, Harvard University, Cambridge, Mass.

Dr. Lawrence Kruger, associate professor of anatomy, University of California, Los Angeles, Calif.

[From the Journal of the American Veterinary Medical Association, Dec. 15, 1965]

SCIENTIFIC AND ADMINISTRATIVE CONCEPTS BEHIND THE ESTABLISHMENT OF PRIMATE CENTERS

(By Willard H. Eyestone, D.V.M., Ph. D.¹)

Serious consideration for more extensive use of nonhuman primates in biomedical research by American scientists gained strong impetus in the late 1940's. Though several productive programs had been underway for about 20 years, the lower vertebrate species were used predominantly. The expense of building suitable facilities and of purchasing primates doubtlessly limited the use of these animals. The advent of specific sums of money from the Federal Government for primate research was yet to come.

Research on the nervous system, basic mechanisms of behavior, reproductive physiology, and studies of infectious diseases such as yellow fever, malaria, tuberculosis, and poliomyelitis had proved the unique value of nonhuman primates as laboratory species. With the national acceptance of Salk poliomyelitis vaccine and the concomitant demand for monkeys in its production and testing and the larger appropriations by Congress to support biomedical research, the time seemed propitious for a national effort to provide proper facilities for broad research using primates.

The Advisory Council of the National Heart Institute, one of the nine Institutes of the National Institutes of Health, took the lead in this planning. This Council and other scientific advisers recommended, however, that the proposed program of primate research be studied beyond research in cardiovascular diseases and that a large national center be established along the lines of the Woods Hole Marine Biology Laboratories. Such a proposal was presented; however Government officials considering the plan requested an alternative plan for the establishment of several regional centers throughout the country. The latter plan was apparently more acceptable, and funds were made available by Congress in the fall of 1959 for one or two "regional primate research centers." The first year, grants for the establishment of one center were awarded, to be followed by two more awards in the second year and four in the third year, to complete the series of seven centers. Regionality was never a clearly defined term, although there were obvious implications of geography and of scientific interests, and both factors were taken into consideration in making the awards.

The program was set up as a coordinated effort on the part of the Federal Government, sponsored by the Public Health Service, to meet the recognized need for suitable facilities for conducting research on nonhuman primates. The initial responsibility for administering the program was left with the National Heart Institute, with the understanding that at some future date it would be transferred to another unit of the National Institutes of Health whose responsibilities were not oriented to the study of any specific disease category. Thus the primate center program was transferred to the Division of Research Facilities and Resources upon its initiation in 1962.

A primate research center as defined in this program is an organizational entity that provides the best possible environment in which resident and visiting scientists of many disciplines can advance knowledge of the biological characteristics of the primate as it relates to the health of man. Such a center in spirit and in fact represents a major resource facility to meet regional and national needs.

¹ Dr. Eyestone is Chief, Animal Resources Branch, Division of Research Facilities and Resources, National Institutes of Health, Bethesda, Md.

A report similar to this one was presented to the Joint Zoological Society/World Health Organization Symposium on the use of primates in medical research in London, England, on June 15, 1965. That report will be published in the Symposia of the Zoological Society of London Series early in 1966, with other symposium proceedings.

ESTABLISHMENT OF PRIMATE RESEARCH CENTERS²

The first primate center award was made in 1960; the remaining six by the middle of 1962. These centers are financed by Public Health Service grants awarded to the universities or foundations which serve as host institutions and are responsible for the centers' operation and administration. Each award provided two grants: a construction grant that in some instances paid for the land, and an operation grant. The latter is a commitment of funds at established levels for 7 years in advance. Provisions were made, however, for total scientific review of the program at the end of the fourth or fifth year of operation, at which time the level of funding is established up to the seventh year in advance of the review.

The terms of the awards stipulate that the institution receiving the grant be responsible for financial management and also for providing an academic setting of high standards for visiting and resident scientists. Because each center was to be a resource for a "community" of scientists, the host institution also agreed to make the facility and the primates available to collaborating scientists from other institutions and to share information of common interest with other primate centers.

There were far more applications for these center grants than could be awarded. Each application was reviewed by a committee of experts and by the National Advisory Heart Council. Their recommendations for awards followed not only intensive reviews of the applications, but also visits to the institutions by the staff of the National Institutes of Health and by the Committee. The initial groups to review the scientific merit of the proposal were nongovernmental scientists selected for their outstanding competence in the field and who were actively participating in research. The final recommending group also consisted of nongovernmental people, including both senior scientists and prominent lay citizens—an "advisory council" whose responsibility is to make recommendations to the Surgeon General of the Public Health Service on expenditures of public funds for health-related research.

Criteria on which the recommendations were based included the caliber of the scientists who would be on the core staff of the center, their experience in the field of primate research, and the scientific merit of the proposed research to be conducted in the center. A limit of seven centers was set by Congress.

Because the design of animal facilities is a specialized field and the design of primate research centers unique, no set pattern was developed. Architects, center directors, and specialists from the National Institutes of Health worked closely throughout the planning and construction of each center.

The conditions of the annual grant for operating expenses of the center are negotiated with National Institutes of Health staff up to the amount previously recommended by the reviewing scientific committee. Additional operating funds, if needed, are sought through supplemental applications subject to scientific review. The operational support may include the entire research program, but individual staff members may apply to other sources for support of their research projects to be conducted at the center.

Each of the seven centers has its own general area of investigation that is related to, but does not duplicate, research being conducted at the other six centers. It is not "directed" research. The central theme of each center's program developed largely around the interests of a particular institution submitting an application. For example, at the University of Oregon the primary interest of those scientists involved in the research program was reproductive physiology. This then became the main focus of activity at that center, with

² Primate center directors and their addresses:

Dr. Geoffrey H. Bourne, director, Yerkes Regional Primate Research Center, Emory University, Atlanta, Ga.

Dr. Harry F. Harlow, director, Wisconsin Regional Primate Center, University of Wisconsin, 22 North Charter St., Madison, Wis.

Dr. William Montagna, director, Oregon Regional Primate Research Center, 505 Northwest 185th St., Beaverton, Oreg.

Dr. Arthur J. Riopelle, director, Delta Regional Primate Research Center, Covington, La.
Dr. Theodore C. Ruch, director, Regional Primate Research Center, University of Washington, Seattle, Wash.

Dr. Leon H. Schmidt, director, National Center for Primate Biology, University of California, Davis, Calif.

Dr. Bernard F. Trum, director, New England Regional Primate Research Center, Harvard Medical School, 25 Shattuck St., Boston, Mass.

peripheral interests developing as new staff members were added. Each of the seven centers has some interest in reproductive physiology, but Oregon is the only one which has primary dedication to this subject.

A center's basic area of research is carried on by a "core" staff of scientists from several disciplines. Facilities are also made available to scientists of other institutions for collaborative studies and to individual visiting scientists whose research studies with primates can best be carried out at the particular center.

Center coordination of the developmental pattern of programs is through the Animal Resources Branch of the Division of Research Facilities and Resources, National Institutes of Health. This branch has a scientific advisory committee to make recommendations about the merit of research programs and the financial level at which a center will operate.

A primate center has three essential components: (1) the "core" research program; (2) a visiting scientists' program; and (3) collaborative research.

The core program established the central theme of the center's research activities. Its members work full time at the center, but often hold academic positions in the host university. In any case, their selection and salaries are always based on university policies.

A visiting scientists' program provides for use of animals and equipment for interested scientists from other institutions who wish to spend some time at the center to conduct a discrete research project. An application for such use of the center is reviewed by the center to ascertain its merit and suitability.

The collaborative research program is one in which scientists either at the host institution or at other places collaborate with "core" staff personnel and may or may not actually work at the center. An example of this was the recent testing of antigenic material (in monkeys) prepared by a scientist in Eastern United States at one of the west coast centers. The two scientists had established good working relations but needed each other's talents, facilities, and animals in order to carry the experiment to completion. After one visit at the primate center, arrangements were made to conduct the experiment, the two scientists communicating by telephone and mail.

Then, of course, there are the instances of scientists throughout the country who request specimens such as blood samples or fresh or preserved tissues or who wish to make brief observations of a group of animals. These visits can usually be arranged informally through center staff personnel.

Oregon Primate Research Center.—The first center to be established was the Oregon Regional Primate Research Center, Beaverton, Oreg., on 160 acres of land in the countryside about 10 miles from the University of Oregon Medical Center in Portland. The principal theme of research activity at this center is reproductive physiology. Other research activities going on there include anthropology, cardiovascular physiology, cutaneous biology, immunology, neurophysiology, biomathematics, and radiology and pathology. The center has some 50 scientists and a supporting staff of about 170. This center is now fully staffed, their available space consisting of some 81,000 square feet, including maintenance facilities.

Wisconsin center.—The regional center at Madison, Wis., was completed in June 1964, and is now operating at capacity. It is adjacent to the University of Wisconsin's primate laboratory which is about 10 years old, and in many of its program aspects, it overlaps the regional center. As would be expected from the outstanding work of this group of scientists led by Dr. Harry Harlow, the program orientation at this center is in the behavioral sciences. Approximately 50 percent of the current research effort is in this field. Other units include pediatric biochemistry and mental retardation, experimental pathology, psychopharmacology, and studies on adrenocortical function. There are approximately 33,000 square feet of space in this center.

Washington center.—In the extreme northwestern corner of the United States is the Regional Primate Research Center of the University of Washington. This center was completed and dedicated in November 1964. Its prime research program orientation is in neurophysiology and gastrointestinal physiology. Emphasis in other areas includes skeletal and dental development, and obesity and dietary factors in cardiovascular disease.

A unique activity of this center is a computerized bibliographic service on "medical research utilizing the nonhuman primate." This service is available nationally. The center has also established a primate literature collection of

publications on the nonhuman primate throughout the world, which is available in the original form or on microfilm. The building is on the campus of the University of Washington Medical School and occupies approximately 36,000 square feet. Fourteen scientists and thirty-three supporting staff members are currently assigned to this center.

Delta center.—The Delta Regional Primate Research Center is at Covington, La., on 500 acres of land, 35 miles from downtown New Orleans. Its host institution is Tulane University. In this location, consideration was given to the tropical environment and the use of large all-year outdoor caging of a variety of primate species. The center was completed in November 1964. The research program orientation at this center is on infectious diseases, particularly those found in the United States. Other research areas include genetics, developmental and embryologic disorders, the behavioral sciences, environmental health, and chronic, metabolic, and degenerative diseases. A major study on infectious hepatitis is being conducted here. The physical plant contains some 75,000 square feet. The present staff, about one-half the potential one, consists of 120 persons, including 20 scientists.

Yerkes center.—The Yerkes Regional Primate Research Center is in Atlanta, Ga., and its host institution is Emory University. The center "absorbed" the former Yerkes Laboratory of Primate Biology, formerly at Orange Park, Fla., and is named for Prof. Robert M. Yerkes who established it in 1928. It is on campus property within walking distance of the major campus buildings. The center will be completed this summer.

In keeping with the tradition of the Yerkes laboratories, the center is largely devoted to studies on anthropoids. The behavioral sciences dominate the present research program. Other areas include anatomic and physiologic studies of the brain and of blood fractions relating to immunologic responses. Studies of normal greater apes at this center will be used to establish their "biological profile," since so little is yet known about them. The present census of animals includes 70 chimpanzees, 27 orangutans, and 9 gorillas. Special facilities are being built for a colony of gibbons. Methods of breeding these species are a major concern of the center program. The physical plant contains 58,000 square feet. There are about 25 scientists and 65 supporting staff members.

New England center.—The New England Regional Primate Research Center is on a 100-acre plot of land in the countryside about 30 miles from Boston, Mass. Its host institution is Harvard University. This center's physical plant construction is expected to be finished during the summer of 1966. Research program emphasis for this center is on studies of infectious diseases. Other interests are in endocrinology as related to growth, nutritional studies, and behavior. The New World primates are a principal theme of this center. Its present staff of seven scientists and nine supporting personnel occupy temporary quarters at the Harvard Medical School. There will be approximately 56,000 square feet in the completed buildings.

National center.—The National Center for Primate Biology at Davis, Calif., hosted by the University of California, is unique among the centers. Its program dedication is to the primates per se. Originally conceived of as a "conditioning" center, it is now somewhat transformed into a laboratory in which to develop methods of handling "wild-caught" animals from capture to delivery of healthy specimens to research laboratories. Although there is a great need to develop sounder procedures of medical care for these "wild-caught" animals after their delivery, it was felt that studies in depth on normal parameters were vital not only to these procedures, but to a better understanding of the animal from its origins to its experimental usage. The objectives are to provide a broad body of knowledge on comparative biology of nonhuman primates, with emphasis on defining the utilities of diverse subjects for biomedical studies.

Additional goals of this center are (1) the development of simple and reliable techniques for the procurement, housing, and breeding, as well as maintenance and manipulation of a wide variety of species; (2) to make such animals available to guest investigators at the center for experimental use; and (3) to provide special breeding stock or other unique subjects to investigators in other institutions for approved studies. More than 900 specimens of 8 different species are being maintained in temporary quarters.

In addition to a variety of studies on the naturally occurring diseases of these animals, a team of scientists is now in India studying population distribution, behavior patterns, and health status of rhesus and bonnet macaques and the Indian langur. This study is intended to provide the bases for improved pro-

curment of monkeys from India and to become a prototype for similarly oriented field studies in other geographical areas.

This center has a current staff of about 20 scientists and 32 supporting personnel, all in temporary quarters provided by the university. Its new facility, on a 300-acre site on the campus, will consist of 61,500 square feet. The construction of this center will be finished in late 1965.

DISCUSSION

In the months to come, programs will be established for the dissemination of information and material to the world's scientific community. Already under consideration is the development of a Registry of Comparative Pathology which will be part of the American Registry of Pathology at the Armed Forces Institute of Pathology in Washington, D.C. This activity will provide the mechanism for the collection of the unusual specimens associated with the primate, along with detailed documentation of medical history and diagnosis. Such material will then be generally available for review, study, and research. It will also provide the mechanism for the preparation of study sets and other educational material which will include photographs and microscopic slides of both normal and abnormal tissue of the many species of primates utilized in medical research. In conjunction with this Registry, a system of exchanging biological specimens and material is also being planned. There is a growing requirement by many investigators for selective primate material, and it is believed that many of these needs can be met through the resources of the National Primate Research Center program.

Another major undertaking will be the establishment of a primate biological data storage and retrieval program. Each of the primate centers has established a detailed colony records system which, for the first time, provides an accurate record of the medical history of large numbers of many species of primates. It is believed that by establishing a central source where all this data can be recorded and selectively retrieved, a valuable service can be provided to those engaged in medical research programs.

Such a system can be readily expanded to include not only primate biological data being accumulated by those not directly associated with the primate research center program, but it can also include biological data of other laboratory animals for worldwide dissemination. Needless to say, the primate information exchange already established at the regional primate research center of the University of Washington will continue to expand in the years ahead to provide service for the identification and dissemination of published material on the primate.

It is much too early for an attempt to evaluate the success of the primate centers program. The centers are not simply breeding farms with research laboratories. Rather they are research centers uniquely suited for using primates in research. Any future evaluation of their success will have to include a total assessment of their uniqueness and the research results obtained by virtue of their existence. If the enthusiasm in the scientific communities of the United States is an indication of the probability of success, it would appear that the program will indeed serve its purpose well.

Mr. REUSS. No balance-of-payments effects from the University of Wisconsin center, are there?

Dr. SHANNON. No, sir.

Mr. REUSS. Great. Dr. Wilson, let's take a look at those Icelandic ptarmigans.

Dr. WILSON. I was about to talk to the Icelandic grant.

Mr. REUSS. Would you read the first sentence in your justification of that item.

Dr. WILSON. Yes. "Research"—

Mr. ROSENTHAL. Mr. Chairman, if I might just pursue that last point. I think the chairman wanted a direct answer. In view of the balance-of-payments problem, if you had told the Altmans that you would have given them the grant if they worked at Emory rather than in Canada, is it your opinion they never would have stayed in Canada?

Dr. WILSON. Well, there are two points I would like to make in response to that question. First, the Emory primate center was not established at the time the grant was made to the Altmans in Canada. And, second, I don't believe the Foundation or any other Government agency in support of science via research grants would suggest to a prospective principal investigator that if he moved to a different university, he might have a better chance of getting a grant. I doubt that—

Mr. ROSENTHAL. I can understand the scientific impetus for that opinionedness, but considering the balance-of-payments problem, don't you feel any additional responsibility?

Dr. WILSON. Yes. I feel very strongly on the responsibility toward the balance-of-payments problem and to respond—

Mr. ROSENTHAL. Give us one example of when you exercised that strong feeling.

Dr. WILSON. Yes. I can answer that in a general way by saying that a ceiling, the type of ceiling which was being discussed before, also is given to the NSF each year by the Bureau of the Budget. We have been enjoying a ceiling of \$750,000 each year for the last 3 fiscal years, and we have not gone through the ceiling in the last 2 fiscal years. I doubt that we will approach it any more closely this year than we did in the last 2 fiscal years. So that to the extent that we have not supported things between whatever our obligation rate was and the ceiling, I think illustrates that we have turned down, requests from individuals who are in foreign institutions and have not been supported. That I think would be a general answer to your question.

Mr. REUSS. Let's examine the arithmetic of that ceiling. The ceiling for the last 3 years has been \$750,000.

Dr. WILSON. We have had a ceiling of \$750,000 since fiscal 1964 and have the same ceiling this year.

Mr. REUSS. And isn't it a fact that your expenditures in the years since that ceiling has been imposed have been on the order of only \$500,000 a year?

Dr. WILSON. In fiscal 1964 our obligation for research supported in foreign institutions in "ceiling" countries was \$321,500 and in 1965 it was \$408,700, and we estimate this fiscal year that it will go beyond that, and I gave you a figure of \$500,000. We have this year the possibility of jointly supporting a radio astronomy project in Australia which is the basis for the \$100,000 level beyond the \$400,000 of last year. We are attempting to meet a roughly 500-plus continuing level with the difference between that and \$750,000 being for things we can't really anticipate.

Mr. REUSS. The fact is, and this is indicative of the nature of these ceilings, that although year after year you are spending around 50 percent of the ceiling figure the Bureau of the Budget has made no effort to reduce your ceiling, is that not a fact?

Dr. WILSON. No. If you look at table 1, you will see that in 1963 it was considerably beyond that. What happens—

Mr. REUSS. The ceiling wasn't imposed until 1964.

Dr. WILSON. That is right. I say the obligations were considerably higher in fiscal year 1963. The discussions of the ceiling would go essentially like this. The Bureau gets us to estimate each year about

what our program level will be. We look at the expectations and give them a figure. I believe as in the case of the other agencies, the degree of responsibility is not reflected by an attempt to go up to and just meet the ceiling. The degree of responsibility is reflected in our attempt to support research abroad within the policies and practices that have been established. Knowing these, we try to do the best we can in judging proposals as they come along.

Mr. REUSS. My point was what good is a ceiling if year after year it is 50 percent more than the agency is spending? That doesn't seem to be a very Procrustean bed in which—

Dr. WILSON. What good a ceiling is relates to the 1963 figure of \$1,666,000. The ceiling brought us down considerably from that level.

Now, I should say, Mr. Chairman, parenthetically, I can't speak about Foundation programs before July 1 of 1963. I returned to the Foundation then.

Mr. REUSS. Now let's get to that \$32,900 for the study of ptarmigans in Iceland, and let me read the first sentence of your justification. Please correct me if I make a mistake in reading it:

The research supported by this grant is an outgrowth of the interest of the U.S. State Department's Office of Cultural Exchange in developing better relationships between the United States and Iceland.

Now, I don't doubt for a moment that a grant for a study of a ptarmigan will please the Icelanders who get the benefit of the expenditure of that grant money. But since when is the National Science Foundation in the foreign relations business? I thought we handled good will abroad by foreign aid programs that went through the committees of Congress and foreign aid of the State Department.

Dr. WILSON. Well, again in the interests of giving the committee all of the information we had available with respect to grants asked about, I wrote that sentence, knowing that such a question as you just asked would be asked.

Let me make one other point, however. That the State Department suggested this possibility would not automatically lead to a research grant. If we had not as a result of a survey by Frank Pitelka, who is probably the world's leading ecologist, if it had not been possible to support a research grant that made scientific sense from the point of view of people interested in population dynamics, we would not have made this grant.

I put the first sentence in there to tell you the preceding circumstances to making the research grant. The research grant itself will stand on its scientific merits and its evaluation in terms of the questions you are raising should not be made in terms of the first sentence. I did not want to omit that first sentence because there is no point in not saying it because that is what happened. But let me repeat, the making of that particular research grant was not based on international relations. It was based on the quality of science available and the importance and particularity of the problem to an area of interest to ecology. That is why we sent Pitelka over to Iceland to look.

Mr. REUSS. Ecology is one of my favorite sciences; but don't you think the study of a ptarmigan could have waited a year or two until our payments had been brought into balance—until the United States had been able to rise up off its knees and do some of the things at home

and abroad that it wants to do, including support of scientists at home which it won't be able to do if we run further balance-of-payments deficits and foreign central bankers continue to demand gold, or alternatively, if Congress reduces its expenditures including those for science?

Dr. WILSON. I think it is important, Mr. Chairman, to read the last sentence of the justification also. This project has a very direct relationship to an ongoing research program at the University of California under Pitelka and one of Pitelka's graduate students is getting his training in the field on this project. So that in a sense it is contributing directly to a U.S. student.

Mr. REUSS. Thank you.

Do you care, Dr. Wilson, to comment further on any of the other specific cases that are presented?

Dr. WILSON. Well, I would like to make a point again, that it is most important for U.S. science to have available to it laboratories abroad in which there is ongoing work that is closely related to the U.S. scientific effort, directed by individuals of the very highest caliber, from whom U.S. science through postdoctoral associateship gets tremendous uplift.

In the field of science, ideas are the rare things that you are looking for. And I am certain that exposure to work in Porter's laboratory and the subsequent discoveries by the large number of individuals that have trained under him could not have been possible and would not have happened had they not worked with Dr. Porter. The number of individuals from the United States who go to these very good foreign laboratories for training is considerable and it is in that sense that we expect a foreign grant to reflect support of work of the very highest in scientific quality to be done in a place that either contributes to U.S. training or somehow contributes to the problem under study. Within the administrative limitations that have already been discussed, in terms of indirect costs and so forth, we try to make the best judgment that we can and meet responsibilities toward the gold-flow problem.

Mr. ROSENTHAL. Mr. Chairman, may I ask a question?

Dr. WILSON. We may fail sometimes but—

Mr. ROSENTHAL. Have we had any requests from any scientists residing in Iron Curtain countries?

Dr. WILSON. For direct research support? Yes. I am certain, although if you asked me to name them I couldn't as of the moment, but I am certain we have talked to Polish scientists and I am certain we have talked to Yugoslav scientists.

Mr. ROSENTHAL. Is there prohibition against them receiving any grants that you know of?

Mr. KELLY. In the case of Poland, Mr. Rosenthal, there are available Public Law 480 funds, and so research supported there does not constitute a drain on the outflow of gold. But it is paid from local currencies that belong to the United States.

Dr. WILSON. So far as the Foundation is concerned, I know of no legal prohibition, but as in all cases with respect to grants to foreign institutions, we must clear them through the State Department and the State Department would have something to say about it.

Mr. ROSENTHAL. So that your remarks saying that the grants are given on a purely advantageous scientific basis—

Dr. WILSON. I said they must qualify on that basis.

Mr. ROSENTHAL. In other words, our foreign policy does have some modest effect on your granting operation.

Dr. WILSON. To the extent that the National Science Foundation by law must clear all of its grants to foreign institutions and they must conform to U.S. foreign policy, that is true. That is in our act.

Mr. ROSENTHAL. Have you had a situation where there was a unique scientific research, in Yugoslavia or some place like that, where you wanted to give the grant and the State Department suggested that you do not?

Dr. WILSON. Offhand I do not recall such a case. But as I say, I have been back in the Foundation only since July 1963, and I don't see all requests, but I don't recall such a case.

Mr. REUSS. Mr. Dickinson?

Mr. DICKINSON. Dr. Wilson, a couple of questions. I ask you the same questions I asked the previous witness, Dr. Shannon. Who makes these decisions in your outfit?

Dr. WILSON. Proposals come into the Foundation from scientists who are primarily in universities and colleges. They are assigned to a specific program area within the administrative structure of the Foundation. In general, and I say in general because it may vary slightly from program to program, proposals are reviewed by scientists who are from the scientific community working as consultants for the Foundation. In addition we have proposals sent to scientists who are not consultants to the Foundation but who read them out of the goodness of their hearts. Recommendations from the reviewers sometimes sitting in a panel situation, sometimes by mail, come back to the program official. He is called Program Director or Section Head. The judgment of the reviewers is collated and again judged by the program official. He makes a recommendation which eventually wends its way to the Office of the Director.

At one time in the history of the Foundation the National Science Board had to pass on every grant. As time went on the authority to sign a grant for the Foundation was delegated by the Board to the Director and in turn to me, so that we can take action on grants below certain levels—currently \$500,000 per year.

Now, again, the Board comes into the picture because each time the Board meets, we report that to the Board action on all grants that are made between Board meetings.

Mr. DICKINSON. Pursuing that just a bit further, Dr. Wilson, did the Board and you have any contact and discussion with the recommending panels of scientists acting with you—did you have any discussion relative to the balance of payments and our deficits and the problems that we were experiencing, that there must be a cutback of that type of thing?

Dr. WILSON. The policies and practices to which I referred in Circular 45 in the paper that I submitted—this circular has been presented to the National Science Board and each year we review with the National Science Board the total effort of the National Science Foundation in the international area, including research grants and all the other kinds of things we do. In turn every program official

in the Foundation get copies of the regulations and in turn in appropriate cases such as this one they are discussed with panels.

The policies under which the Foundation operates in its research grants are made explicitly known to advisers. However, let me add one thing. The advice from the panel is largely with respect to the scientific quality of the proposals they are reviewing and the responsibility for carrying out the administrative policies of the Foundation rests in a program to see that they are satisfied. We do not depend on the panel to make certain that the policies are met by the particular proposal.

Mr. DICKINSON. I don't know if this is a fair question but I am asking you a personal opinion. How much do you think personal friendships influence the approval of various grants?

Dr. WILSON. Well, can we go off the record for this?

Mr. DICKINSON. Yes, if you like.

Mr. REUSS. Surely.

(Discussion off the record.)

Mr. DICKINSON. Let's get back on the record.

You mentioned a figure of \$109 million in the earlier part of your testimony, if I understood you correctly. Did you use that figure as your total grants? \$109 million?

Dr. WILSON. I said for fiscal 1966 the estimated support of basic research project grants would be \$160 million.

Mr. DICKINSON. \$160 million. By the National Science Foundation.

Dr. WILSON. Right.

Mr. DICKINSON. Of the \$160 million, how much of that would be abroad now?

Dr. WILSON. Well, we can't spend more than \$750,000 because that is the ceiling.

Mr. DICKINSON. \$750,000. That is your overseas ceiling.

Dr. WILSON. Our estimate is about \$600,000.

Mr. DICKINSON. I wanted to make sure.

Dr. WILSON. That is about equally divided between U.S. citizens abroad and non-U.S. citizens abroad.

Mr. DICKINSON. All right. Now, you made one statement that the geographic uniqueness sometimes justified the granting of, making of a grant. What do you mean there?

Dr. WILSON. Well, if a man wanted to do research on stars that appear in the Southern Hemisphere, he would have to go to an observatory in the Southern Hemisphere. Or, if you wish to work on tropical biology, and we have biologists in this country who do research on problems of tropical biology, you would have to go to the tropics.

Mr. DICKINSON. By the same token you have to go to Iceland to study the Icelandic ptarmigan.

Dr. WILSON. Right.

Mr. DICKINSON. It was your opinion and the opinion of your Foundation that regardless of our deficit in the balance-of-payments situation, it was worth \$32,000 to the United States at least to find out about the Icelandic ptarmigan. Is that right?

Dr. WILSON. That is correct.

Mr. DICKINSON. I have no further questions.

Mr. REUSS. Let's turn now to the Department of Defense, Dr. Larsen.

STATEMENT OF DR. FINN J. LARSEN, DEPUTY DIRECTOR, DEFENSE RESEARCH AND ENGINEERING, DEPARTMENT OF DEFENSE; ACCOMPANIED BY EDWARD M. REILLEY, ASSISTANT DIRECTOR, DEFENSE RESEARCH AND ENGINEERING (RESEARCH), DEPARTMENT OF DEFENSE

(The prepared statement of Dr. Larsen is as follows:)

PREPARED STATEMENT OF DR. FINN J. LARSEN, DEPUTY DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING, DEPARTMENT OF DEFENSE

Mr. Chairman and members of the subcommittee, I am pleased to be able to meet with this subcommittee today and review for you some of the efforts which have been underway in our research program which are aimed at reducing our balance-of-payments deficit. Although some of our attempts in this particular field have been underway for several years and are somewhat encouraging, I must admit that we share your concern in this matter, for it is a fact that the balance-of-payments problem has not been solved. Frankly I feel that solution of this problem, in the end, can come only by a more critical examination of all of our spending overseas and cannot argue that research should carry any special class protection from examination.

As I am appending a specific report containing answers to the questions addressed to the Secretary of Defense by your chairman in his letter of January 14, I should prefer to describe to you our current attempts to reduce that part of the balance-of-payments due to our foreign research operations and conclude with comments on other options which I believe need further study yet offer considerable promise in the future.

First of all I should mention that foreign research activities of our department exist both in our research and exploratory development budget categories, the former containing all of our basic research and the latter containing a considerable fraction of our applied research activities. Beginning in 1964 we placed target reduction goals on foreign obligations in the research category for fiscal years 1964, 1965, and 1966 for the countries in Western Europe, Australia, and New Zealand. These goals for these 3 fiscal years were stated in an exchange of correspondence between the Deputy Secretary of Defense and the Director of the Bureau of the Budget to be 20 percent, 35 percent, and 50 percent reduction from the amounts obligated in these countries in fiscal year 1963. They were incorporated in an internal directive to the Army, Navy, and Air Force during August 1963. These same target reduction goals were later extended to apply to our exploratory development obligations but were later extended to performance by a year, so that the full 50 percent reduction is not expected until fiscal year 1967. It should be noted that in arriving at these firm goals that Canada was exempted as a country from the group because of considerations relating to mutual defense interests with that country under the production and development sharing program.

Prior to this obligation restriction, in August 1962 the Secretary of Defense had issued policy restriction on defense research and development obligations outside the United States which provided that obligations be held to an absolute minimum and that obligations be limited to those in the following categories:

- (a) Obligations pursuant to a treaty or executive agreement between governments;
- (b) Obligations estimated not to exceed \$1,000;
- (c) Obligations meeting requirements in which a determination has been made that they cannot be met from domestic sources.

This policy directive also required that prior to final determination that the approving authority explore the feasibility of cost sharing or barter. These restrictions have been continued in force essentially as stated above by a DOD Directive issued in May 1965.

Although it has been our policy to utilize excess foreign currencies wherever it could be made available it is a fact that such currency has not been available to us in the OECD countries. The Bureau of the Budget Circular of July 2, 1965, does list the following as excess currency countries: Burma, Ceylon, Guinea, India, Israel, Pakistan, Poland, Tunisia, United Arab Republic, and Yugoslavia. With the exception of Israel, defense research involvement with these countries is quite limited, thus the use of excess foreign currency could not be expected to be an important factor in reducing gold flow.

Reductions in gold flow through barter arrangements have been incorporated in defense policy since 1958, however, until fiscal year 1965, these were possible only on an individual contract basis. It was found that this old barter program was not adaptable to small procurements such as research contracts or grants since before any individual procurement could be "bartered" the Commodity Credit Corporation of the Department of Agriculture had to make a feasibility determination for barter in each separate case. In June 1965 we amended our Armed Services Procurement Regulation by providing for special barter payment arrangements. By this means we now can call on the Commodity Credit Corporation to help arrange barter contracts covering foreign costs of a large number of relatively small procurements or payments and generate foreign currency for payment of research grants and contracts as well as the many other services and supplies which we must purchase in Europe for our military forces. The barter program is now working successfully¹ and under the new arrangement with the Commodity Credit Corporation use of barter generated foreign currency for research is limited only by the ability of CCC to provide barter funds, which is in turn limited by their determinations in avoiding undesirable influences on world market and by the actual amounts of stockpiled U.S. products which are available. In the current fiscal year the Department of Defense expects to cover nearly all of its European research expenditures by this barter method.

I would like to concentrate, in the next few minutes, upon future possibilities for effective action. The Department of Defense has endorsed a policy paper produced by the Federal Council for Science and Technology. "Policy Guidance for Research Investment Abroad by U.S. Agencies," and has forwarded this document to all interested DOD components. Although this paper incorporates all of the previously mentioned defense policies on foreign research it brings out clearly some areas in which additional progress may be achieved.

For example, this document states "we should emphasize the development of collaborative efforts involving local support of the foreign component of the program." This has encouraged us to undertake at least two new enterprises. First, we have tried to obtain a measure of the financial cooperation in some of our European research investments. We know that in our Air Force foreign research program that we are paying slightly over 40 percent of the total real research costs, the balance coming from foreign support. Second, we have called upon the Military Departments to consolidate the three defense research offices in Europe into one office, for greater efficiency in their operations.

As you know, cooperation between nations is a two-way street and ultimately depends upon establishing mutual respect and confidence. Even in this area of reduction of foreign research obligations we are disturbed at some of the possible consequences. Some months ago we had encouraged the State Department to sound out the impact of contract and grant terminations within the OECD countries. The results indicate that in three countries there was a significant adverse effect in some research organizations following our reduction when local country support was not available to carry on the work. This kind of a case history indicates that we need a higher degree of advance coordination in these attempts to reduce gold flow if at the same time we expect future collaboration and cooperation from the very same scientists whose work we have supported in the past. We, in the Defense Establishment, need to learn how to discuss such reductions frankly with our counterparts in friendly nations before we act, and then act by agreement and with understanding. This process must be undertaken in a careful, time-phased manner, since none of the defense ministries of the Western World know how much "give-or-take" can be negotiated cooperatively until after the several legislative bodies have decided upon defense appropriations in the several countries. Thus the planning by our department of a target reduction in research support for any one country might easily be upset if it is not matched by viable legislative action in both countries.

There is another interesting aspect to international affairs arising from gold flow reduction policies or lack of mutual agreement on actions undertaken. We know, from a national security point of view that our strongest potential allies are those with strong and healthy economies and possessing advanced science and technology capabilities. Too rapid a rise in any one scientific field or in any special technological field in the United States has often led to the "brain-drain" phenomenon, that is, the weakening of the scientific or techno-

¹ See "Review of Procurement Management in Europe," OASD/I. & L. report, August 1965, p. 34.

logical potential of other nations. We know that this has happened in the past in medicine, in physics, and in aerodynamics. Similarly "brain-drain" can be expected to occur in these or other fields if we precipitously reduce foreign support and try to suddenly replace it in the United States. I have been told that this phenomenon has actually been detected in the field of psychology during the last 2 years. We reduced our support in Canada at the very time when U.S. universities were attempting to build-up in this field; and what appeared to be a "brain-drain" from Canada resulted.

STATEMENT IN RESPONSE TO QUESTIONS RAISED BY SUBCOMMITTEE LETTER DATED
JANUARY 14, 1966

(1) What have been and are estimated to be the amounts of obligations for research abroad by foreign scientists in such programs for the years 1962 through 1966? Please give the annual total amounts of such support and the amounts less Public Law 480 support. (Please state all amounts in terms of obligations.)

*Obligations for overseas research grant and contract programs, fiscal year
1962-66*

[In thousands]

Department	Fiscal year 1962	Fiscal year 1963	Fiscal year 1964	Fiscal year 1965	Fiscal year 1966
Army.....	\$2,685	\$4,113	\$3,856	\$5,746	\$5,324
Navy.....	1,013	2,086	2,162	3,106	2,244
Air Force.....	5,231	7,326	6,422	4,830	3,335
ARPA ¹	1,080	1,675	1,502	1,444	2,189
Totals.....	10,009	15,200	13,942	15,326	13,092
Public Law 480 Funding.....	-660	-1,370	-1,108	-1,109	-557
Total.....	9,349	13,830	12,834	14,217	12,535

¹ ARPA funds obligated through the services are included in the service figures shown above.

(2) What are the amounts of such support which have been and are estimated to be given to foreign scientists in the developed countries (the countries of the OECD, Australia, New Zealand, and South Africa)?

*Obligations for overseas research grant and contract programs in the OECD
Nations, Australia, New Zealand, and South Africa, fiscal year 1962-66*

[In thousands]

Country	Fiscal year 1962	Fiscal year 1963	Fiscal year 1964	Fiscal year 1965	Fiscal year 1966
Austria.....	\$90	\$120	\$79	\$72	\$56
Belgium.....	335	470	293	287	26
Canada.....	206	1,597	1,428	2,251	2,029
Denmark.....	53	85	57	62	45
France.....	1,745	1,187	2,109	365	627
West Germany.....	1,219	1,126	521	819	489
Greece.....	24	14	40	14	27
Iceland.....					
Ireland.....	173	199	47	254	35
Italy.....	574	783	581	651	432
Japan.....	333	452	438	436	626
Luxembourg.....					
Netherlands.....	229	140	234	212	253
Norway.....	492	45	487	335	377
Portugal.....					
Spain.....	80	79	65	83	37
Sweden.....	777	853	629	449	276
Switzerland.....	127	181	99	125	82
Turkey.....	15	16	100		
United Kingdom.....	1,819	1,754	1,806	1,688	1,277
New Zealand.....	5	94	31	8	
Australia.....	83	1,320	279	225	294
South Africa.....	5		5	39	30
Total.....	8,384	10,515	9,328	8,380	7,018

NOTE.—Fiscal year 1962, 1963, and 1964 figures do not contain ARPA funds obligated by the Air Force since a by-country breakout was not available for these years. The totals of such funds were small (averaging less than \$200,000 per year over the period concerned).

(3) Under what specific statutory authority are such grants made? Please quote from the statute.

Grants for the support of research by the Department of Defense are made under authority of Public Law 85-934, an act to authorize the expenditure of funds through grants for the support of scientific research and for other purposes, as approved September 6, 1958. This act provides "That the head of each agency of the Federal Government, authorized to enter into contracts for basic scientific research at nonprofit institutions of higher education, or at nonprofit organizations whose primary purpose is the conduct of scientific research, is hereby authorized, where it is deemed to be in furtherance of the objectives of the agency, to make grants to such institutions or organizations for the support of such basic scientific research."

This act also provides discretionary authority "to vest in such institution or organization, without further obligations to the Government or on such other terms and conditions as the agency deems appropriate, title to equipment purchased with such grant or contract funds."

(4) Has the attention of the Congress been called to the existence of these foreign grants? If so, when and in what context? Please give specific citations. Do such amounts appear separately in the budget submissions to Congress?

Public Law 85-934 requires that the Department of Defense make an annual report to the Congress on its use of the grant authority. This requirement is met by an annual publication entitled "Department of Defense Grants for Basic Scientific Research," which contains a section devoted specifically to grants to foreign nonprofit institutions. It is our understanding that these reports, after receipt in the Congress, are returned to the Government Operations Committee of the Senate and appear both in the Calendar of the Government Operations Committee of the Senate and in the Journal of the House as well as in the index to the Journal under "Communications."

During the hearings of the Subcommittee on Science, Research, and Development, of the Committee on Science and Astronautics, on July 13, 1965, a question was raised on the support of the education of foreign students by the Honorable George E. Brown, Jr. In answering this question, the Department of Defense supplied to Mr. Joseph M. Felton, assistant counsel of the committee, information on foreign research support for fiscal year 1964.

On June 17, 1965, during the hearings of this subcommittee on the Conflicts Between Federal Research Programs and the Nation's Goals for Higher Education, we submitted to Mr. Harry L. Seldon copies of "Department of Defense Grants for Basic Scientific Research" for calendar years 1962, 1963, and 1964. However, it should be noted that during this hearing the subject of foreign research was not discussed.

Within the Department of Defense foreign research projects are funded as part of research programs, the bulk of which are performed by U.S. institutions. For this reason, there are no line items in the budget which separately account for foreign research support.

(5) What restrictions or policy instructions on the permissible amounts of such grants or contracts have you received? Please cite specifically and indicate how and when they were put into effect.

The Director of the Bureau of the Budget proposed, in a letter to the Secretary of Defense dated May 29, 1963, that the Department of Defense reduce its research support activities by 50 percent in certain countries.

In his reply, dated August 2, 1963, the Deputy Secretary of Defense agreed to a modification of the proposal in which the level of obligations would be reduced to 80, 65, and 50 percent of the 1963 level in fiscal years 1964, 1965, and 1966, in Western Europe, Australia, New Zealand, and Canada (Canada was later excluded from the list).

No other restrictions or policy instructions on the permissible amounts have been received by the Secretary of Defense.

The above-reduced levels of foreign research obligations were placed into effect by a memorandum by the Director of Defense Research and Engineering on August 14, 1963, which was addressed to the Assistant Secretaries (Research and Development) of the three military departments.

(6) Have any additional restrictions been put on these grants by your department or agency? Please cite specifically.

Policy on excess currency use

It has been our policy (reference 1) to utilize excess foreign currency, where available, for payment of foreign research. At the present time excess currencies are available only in the following countries:

Burma
Ceylon
Guinea
India
Israel

Pakistan
Poland
Tunisia
United Arab Republic
Yugoslavia

With the exception of Israel, DOD research involvement with these countries is quite limited, therefore, the use of excess foreign currency has not been an important gold-flow reduction factor for research.

Policy on special barter

DOD policy (reference 2) has encouraged limiting gold flow through use of barter procedures. Foreign currency can be generated by special barter agreements; that is, the sale through an export agent of surplus U.S. commodities. This means of limiting gold flow has become an important factor within the DOD. In fiscal year 1966, nearly all of their research procurement expenditures in Western Europe will be paid with barter-procured foreign currency, allowing the appropriated dollars to be returned to the Treasury.

Policy on procurement of research and development outside the United States

DOD policy (reference 3) is that R. & D. obligations are to be held to an absolute minimum. All foreign research procurement must be reviewed so that a determination is made that they cannot be met by domestic sources.

References:

- (1) BOB Circular 66-1, dated July 2, 1965.
- (2) Armed Services Procurement Regulation, Revision No. 11, dated June 1, 1965.
- (3) DOD Directive 7060.5, dated May 14, 1965.
- (7) What additional measures could be taken by your department or agency to reduce the amounts of these grants or contracts?

We can intensify our efforts to persuade the appropriate governments to provide local support. Part of the new consolidated European Research Office will be devoted to seeking cooperative efforts in this regard.

We can attempt to be even more selective in making determinations of foreign procurement as we generate more research capability in certain specialized fields of science within the United States. However, this is by no means a course of action that guarantees general success. There are times when foreign expertise exists in which little or no U.S. motivation is present upon which we could develop plans.

Minor reductions could be attained by stricter controls on foreign equipment procurement or by U.S. purchase of suitable research equipment and apparatus. In some cases, this would cause an increase in total program cost, yet permit a reduction in gold flow. We do not view this measure as being profitable in the long run.

Mr. REUSS. Let me put to you a number of your Defense Department projects in the same hope of justification as our friends from HEW and NSF have given:

One for \$40,000 to an Australian to conduct a study of perspiration characteristics of Australian Aborigines.

A grant of \$78,000 to a Canadian of Hamilton, Ontario, to study the smells of ocean fish.

A grant of \$5,000 to a scientist at the University of Copenhagen, Denmark, to assist in initiation of a new journal on marine biological research.

A grant of \$21,000 to a scientist of the University of Bergen, Norway, to understand the adaptation mechanisms of animals, principally fish and birds, to avoid asphyxia as in prolonged diving and thermal stress.

A grant of \$3,800 to the University of British Columbia, Canada, to collate and analyze oceanic biology information in Far Eastern waters.

One to the University of Birmingham, England, of \$33,500 for studies in neurocommunications.

Another one to the Institute for Documentation, of Milan, Italy, of \$36,000 for a study of automatic English sentence analysis.

Would you justify these grants in terms of our balance-of-payments crisis and Presidential orders relating thereto.

Dr. LARSEN. Yes, Mr. Chairman.

(The DOD grant justifications follow:)

DEPARTMENT OF THE ARMY

Contract DA MD 49 193 :

Water and electrolyte economy of desert aborigines and New Guinea Melanians.

Prof. W. V. Macfarlane, Adelaide University, Australia.

Résumé of project content

The objective in this research is to discover the differences in water content and turnover between Australian meat-eating desert aborigines, Chimbu Melanians who are vegetarians, and Europeans. It had previously been observed that the central Australian aborigine was able to work in the hot and arid desert area without the discomfort and stress of Caucasians. Measurements are being made of the water intake and output, and of the sodium and potassium balance which are known to be critical in cases of heat prostration.

Justification for foreign procurement

This contract was awarded to an Australian university because of their interest in the indigenous natives under study and because of their proximity to the clinical locale.

Military relevance

Loss of effectiveness of Caucasian combat troops under conditions of low water availability and high temperatures has been a long-known phenomenon and one having important military consequences. These studies are aimed at obtaining a basic understanding of the metabolic and dietary differences which permit aborigines to work apparently unencumbered by the heat of the desert, and determining whether performance of U.S. troops could be improved by changes in water intake and diet.

OFFICE OF NAVAL RESEARCH

Contract NONR 3391(00) :

Genetics of fish chemistry.

Prof. H. Kleerekoper, McGill University, Montreal, Canada.

Résumé of project content

The investigator is analyzing the chemical composition of the substances exuded by certain fishes, and will attempt to determine whether there is a correlation in composition between those compounds from different species which school or group themselves together.

Justification for foreign procurement

This contract was awarded to a Canadian university because the investigator was well qualified for research which was not being carried out in any U.S. laboratory. In addition, at the time of award Canada was considered to be exempt from the provision of ASPR 6-103.5.

Military relevancy

The Department of Defense has had a longstanding interest in developing better means of protecting its personnel from shark attacks after aircraft or ship disasters. This research promises to give new basic clues on those particular classes of complex organic compounds exuded from certain species of fishes

which are seemingly immune to shark attacks. Once a basic understanding is available of the chemistry behind natural olfactory repulsion it is believed that synthesis of an optimum shark repellent chemical may become possible.

107-782 MARINE BIOLOGY JOURNAL

University of Copenhagen, total funding \$5,000 (Grant, 1-shot)

Aim: To assist in initiation of a new journal on marine biological research in the North Atlantic and Scandinavian waters.

Military relevance: Part of a program to obtain systematic scientific data on biological factors of interest in connection with military operations. These factors include: fish noises which can interfere with sonar, sonar scattering, bottom sediment condition; biological fouling and deterioration.

Unique:

- (1) Initiative and competence of investigator.
- (2) Interest in biology of areas of the Baltic and North Seas.

107-619 CARDIOVASCULAR ADAPTATION OF ANIMALS TO PHYSIOLOGICAL STRESS

University of Bergen, Norway, funding to date: 50K

Aim:

(1) To understand the adaptation mechanisms of animals, principally fish and birds, to avoid asphyxia as in prolonged diving and thermal stress, as in hibernation.

(2) To obtain information on sea animals in the North and Baltic Seas regions.

Military relevance:

(1) Possible methods of extension of human operation in deep, cold ocean regions, or in prolonged cold, may be indicated by an understanding of animals' adaptation.

(2) Part of a program to obtain biological data in areas of interest for possible military applications.

Unique:

- (1) Talent of investigator.
- (2) Investigator's access to areas very difficult to sample by U.S. scientists.

104-917 FAR EAST SEAS PRODUCTIVITY. AREA: BIOLOGY

University of British Columbia, Canada, funds to date: \$3,800

Aim: To collate and analyze oceanic biology information in Far Eastern waters, using Chinese and Russian fishing data.

Military relevance: Part of a program to improve knowledge of biological factors which can affect military operations in remote areas; in this case in Far East. These factors include: possible acoustical reflection and transmission and types of fish noise; bottom sediment condition; light transmission and reflection and fouling.

Unique: Principal investigator is an expert on biological productivity in the Far East, is fluent in Chinese and Russian, and has a unique collection of Chinese and Russian fisheries data.

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH

Grant: AF-EOAR-63-115 (\$33,500 total over 3-year period).

Title: Studies in neurocommunications (The role of inhibition in information transfer).

Institute: University of Birmingham, Neurocommunications Research Unit, Birmingham, England.

Brief: Research is being conducted on mechanisms by which the nervous system handles and processes information. Specifically, measurements are being made of the transfer function of sensory nuclei and the role of inhibition therein. Particular objectives of the research are a determination of the information-carrying pathways, mechanisms through which codes are transformed, the nature of information storage, the information capacity of neural channels, and the relative weightings assigned by the system to received and stored information.

Relevance: For the design of complex information processing systems, it is necessary to have an understanding and be able to model mechanisms for filtering, coding, storing, and transmitting patterns of information. Since the capacity of any hardware system is limited, and information storage and processing requires large capacities, it is a requirement that hardware be used as efficiently as possible. Living systems are the most efficient stores and processors of information. Therefore, a knowledge of the structure and performance of living systems is sought to provide bases for the construction of required hardware systems.

Justification: The investigator's studies of inhibitory mechanisms are recognized to be of outstanding excellence. The likelihood of his arriving at basic results necessary for the design of hardware systems is viewed as far greater than the likelihood of opposite numbers elsewhere.

Criteria: Unique qualifications and capabilities of investigator.

Grant: AF-EOAR-64-54 (\$36,000 total over 2-year period).

Title: Automatic English Sentence Analysis.

Institute: Istituto Documentazione Associazione Meccanica Italiana, Milan, Italy.

Brief: A procedure is being developed for analyzing natural language that incorporates an examination of semantic (meaning) as well as syntactic (structural) factors for use in real-time machine operations. These factors are identified by means of a correlation structure that is being formulated, e.g., a hierarchic system that accounts for both the meaning of individual words and the relations by which they are linked. A procedure is being examined by which semantic factors can be weighted for machine analysis of sentences and translations. Geometric and mathematical representations of the correlation structure are being studied for reducing machine search operations to predictably possible relationship patterns.

Relevance: Fully automated machine processing of natural language text is a goal for communication systems, documentation systems, and language translation. Models of natural language are therefore required that can specify both the meaning and structure of language. An understanding of the characteristics of natural language also aids in the design of artificial or machine languages that can approach the flexibility of natural language and enable complex information processing tasks to be assigned to machine.

Justification: Few new creative ideas concerning approaches to analyzing natural language have occurred in the last 10 years. Most research in the United States has been limited to refinements of what are now standard approaches, and these approaches do not appear to be able to hurdle the difficulties that have arisen in the specification of the semantic content of language. The investigator's approach is unique and appears capable of making large quantities of semantic content of language reducible to a form that can be transferred to a machine. The investigator is also uniquely qualified in his knowledge of four languages, including English, and in his use of them as though he were a native in them. Additionally, the mathematical approaches he explored are not being tested in the United States. They may incorporate ideas that will be significant in building models for instructing machines on how to handle natural language.

Criteria: Uniqueness of the approach to the analysis of the meaning and structural content of natural language and unique qualifications of the principal investigators to conduct the research.

Dr. LARSEN. As some of my colleagues have done, I also would like to make very brief general statements on this and then I will address myself to some of the specifics of the projects that you have requested, if this is permissible.

Mr. REUSS. Surely.

Dr. LARSEN. First of all, you asked that we address the urgency, the value of the research, whether or not these tasks could be postponed. In my opinion it is almost impossible to measure whether or not a particular piece of research can be postponed. That is, it is exceedingly difficult to measure research in terms of when it will be needed.

We have made studies in the Department of Defense and are continuing them to determine when and how research is utilized in our weapons and other equipment development programs. We are learning from this that some of the research that we utilize is quite old, that other pertinent and necessary research is much more recent.

The point is that if you have not performed a piece of research, you usually don't know in advance that it is unavailable and hence, you do not even initiate the development program. And so to some degree it is extremely difficult to measure whether or not a particular piece of research must be done this year or next year.

You really won't know the answer until at least several years later on.

As far as the value or relevancy, I can address that best by describing the selection process. I will be glad to do that, and then—

Mr. REUSS. I believe you did that in the paper you submitted.

Dr. LARSEN. Yes. There are comments on that in the paper.

I would like last of all simply to make some comments about the actions we are taking, which I am sure you will approve, you and the other members of the committee, Chairman Reuss. These have three general headings—balance of payments, consolidation of our European offices, and third, some further actions which have just been initiated.

Mr. REUSS. How are you coming in bringing together those varied European offices? Every time I go into an American establishment abroad I find a big Department of Defense foreign research office, a Navy office in London, an Air Force foreign research office in Brussels, or another Army research office in Frankfurt, Germany. They are all over the lot. Why don't you bring them together as you did in Rio?

Dr. LARSEN. The decision has been made to consolidate the European offices. The services have just made report—I'm sorry. The services have met and are about to make a report to the Office of the Secretary of Defense, to the Defense level, as to what that site will be. There are rather natural inclinations among each of the services that they ought to stay in their particular location and that the others ought to move.

At the moment the choice which they have not resolved is whether it will be Frankfurt or Brussels, and we expect that they will either resolve this matter or we will make a decision and that the move will be executed this calendar year.

Mr. REUSS. I know I speak for this whole committee when I commend you for that move which I think will effect economies without in any way detracting from the quality of the service.

What about Tokyo and the Far East? There we have got an Army Science Office, an Atomic Energy Science Office, a National Institutes of Health Science Office, and a National Science Foundation Science Office. Why not bring them all into one shop, too?

Dr. LARSEN. I have virtually no knowledge of the relationship of the activities represented by Departments other than the Department of Defense. I really cannot comment as to how effective a merger would be. I quite agree with you that we should very much examine a situation like this, and if we can benefit from mutual housing or mutual contracting procedures, that we ought to do so.

Mr. REUSS. Well, your Army research people down in Rio for the Latin American Continent got together with the National Institutes of Health and the State Department, both of which had competing outfits, and now you are all under one roof to the great joy of the taxpayer and of our balance of payments. Why don't you do that in Tokyo?

Dr. LARSEN. This is not under the sole control of the Department of Defense. We will be very glad to cooperate in such a project, Chairman Reuss, taking a look at what economies can be—

Mr. REUSS. This has been going on for years and everybody is ready to cooperate but nobody is willing to initiate. Will you take the responsibility of initiating this? Somebody has got to do this.

Dr. LARSEN. We will initiate a study of the economies that can be achieved.

Mr. REUSS. And will you report back to this committee any agency which is giving you trouble on effecting economies?

Dr. LARSEN. Yes, sir, we will, Chairman Reuss.

Mr. REUSS. I want to be sure I have my figures right. Research expenditures abroad by the Department of Defense in 1963 were \$13.8 million. In the current year, 1966, they are only down to \$12.5 million. Is that right?

Dr. LARSEN. Yes. Those are the totals after subtraction of Public Law 480 funds have been made.

Mr. REUSS. Yes. Those are the totals that have a balance-of-payments impact.

Dr. LARSEN. Yes; however, there have been other improvements though.

Mr. REUSS. That isn't very good.

Dr. LARSEN. There have been very significant other improvements. In 1963 virtually none of the Air Force funds expended abroad was under barter arrangement. In 1966 all of the Air Force funds are. And so there is at least a comparability to Public Law 480 funds. There is not a direct gold flow. The Army—

Mr. REUSS. However, those items which are subject to a balance-of-payments drain have hardly gone down at all in volume since 1963. Is that not so? From \$13.8 to \$12.5 million.

Dr. LARSEN. No. On the contrary, Mr. Reuss, in the \$12.5 million, nearly all of those expenditures in Europe are currently paid for in local currency which has been generated by barter agreements.

Mr. REUSS. Will you furnish us with a breakdown there as to—

Dr. LARSEN. All of the Air Force funds—

Mr. REUSS (continuing). What was the balance-of-payments impact?

Dr. LARSEN. I will do so.

Mr. REUSS. Thank you.

Dr. LARSEN. In Europe, currently, all of the Air Force payments are, and nearly all but \$100,000 of the Army expenditures are in local currencies. We do not have the figures for the Navy but we will endeavor to obtain them.

(The information referred to is as follows:)

In order to give the subcommittee more clarity and understanding of why the gross amounts for foreign research obligations have not declined as much as we had hoped in 1963 and to explain how important barter operations are

in reducing gold flow in the hard currency countries the following tables are supplied.

TABLE I.—*Foreign research obligations for contracts and grants by geographic regions*

[All amounts in thousands of dollars]

	1962	1963	1964	1965	1966
Southeast Asia and Canal Zone.....	510	2,295	3,343	4,274	5,158
Europe, Australia, and New Zealand.....	7,480	8,466	7,457	5,654	4,333
Canada.....	206	1,597	1,428	2,251	2,029
All other countries.....	1,813	2,842	1,714	3,147	1,572
Totals.....	10,009	15,200	13,942	15,326	13,092

From this table we can see two noticeable trends in obligations. In southeast Asia and Canal Zone we have increased our obligations by a very large amount because of our special counterinsurgency programs and environmental research aimed at improving jungle combat capabilities which we could use in Vietnam today. This increase in foreign research was by design and made by the Department of Defense with full knowledge of the Secretary of Defense and of the Congress, since most of it is part of Project Agile.

The second noticeable trend is the decline in obligations in Europe, Australia, and New Zealand. This decline was the result of our planned reduction program which was mentioned in our response to question 5 of the subcommittee letter to the Department of Defense prior to these hearings. Our target for fiscal year 1966 was to reduce to 50 percent of the level of obligations established in fiscal year 1963. We actually achieved a reduction of 49 percent in obligations in these hard-currency countries over the 3-year period; and also achieved a much greater reduction in gold flow or balance of payments due to other recent developments in financial management, particularly barter operations in Europe.

Table II shows the trend in use of foreign currency generated through Public Law 480, special barter, and other Treasury-owned foreign currency for the same period.

TABLE II.—*Foreign currency used to offset gold flow by defense research agencies*

[All amounts in thousands of dollars]

	Fiscal years—				
	1962	1963	1964	1965	1966
Public Law 480.....	660	1,370	1,108	1,109	557
Barter funds.....				188	6,228
Other excess foreign currency.....			73	175	143
Total foreign currency.....	660	1,370	1,181	1,472	6,928

From this table can be seen the recent and striking impact of the DOD policy on barter procedures previously mentioned. Since Public Law 480 currencies are not available to the Department of Defense in the well developed countries, particularly those of Western Europe, the special barter operation has been developed with the cooperation of the Commodity Credit Corporation with the objective of completely offsetting the gold flow into these countries. We have not included in this table any offsetting attributable to foreign purchases of U.S. research apparatus or materials since we do not keep detailed statistics on these expenditures made by foreign scientific laboratories in our Washington offices.

The following table is submitted to demonstrate the balance of payments situation for these research obligations and is our best estimate of the upper limit of gold flows ensuing from these obligations.

TABLE III.—*DOD balance-of-payments impact due to research obligations*

[All amounts in thousands of dollars]

	Fiscal year 1962	Fiscal year 1963	Fiscal year 1964	Fiscal year 1965	Fiscal year 1966
Total research:					
Contract and grant obligations.....	10,009	15,200	13,942	15,326	13,082
Foreign currency offsetting gold flow.....	660	1,370	1,181	1,472	6,928
New balance-of-payment impact.....	9,349	13,830	11,761	12,854	6,164

We would like to reduce this balance-of-payments deficit further, with the ultimate objective of attaining true balance. However, the increase in research in southeast Asia and Canal Zone presents a particular difficulty to us at this time, since the fiscal year 1966 obligations level of \$5,158,000 in these countries is so large in comparison with our estimated balance-of-payments deficit of \$6,164,000.

MR. REUSS. Thank you. I wanted, Dr. Larson, to take up with you a couple of points which you made in your written statement which seem to me to go to the heart of what we are talking about. You say:

As you know, cooperation between nations is a two-way street and ultimately depends upon establishing mutual respect and confidence. Even in this area of reduction of foreign research obligations we are disturbed at some of the possible consequences. Some months ago we had encouraged the State Department to sound out the impact of contract and grant terminations within the OECD countries.

Those are the 17 countries of Western Europe which are our allies.

The results indicate that in three countries there was a significant adverse effect in some research organizations following our reduction when local country support was not available to carry on the work.

Well, let me stop right there. In effect you are saying that it is our job to buoy up research not only in the United States but in all of these 19 OECD countries and that we have to be very wary of diminishing our support for their research activities because if we do, their own governments might be laggard in assuming their obligations to support their own research.

When did Congress ever tell the President and the Department of Defense that our job was supposed to be to build up research abroad? I was never aware of voting for that.

DR. LARSEN. I quite agree, Mr. Reuss. I think we have rather badly put the reactions. We have not made our viewpoint clear to the committee, as clear as we ought.

Since 1963 we have reduced gold flow in successive steps, and in accordance with the direct agreements between the Bureau of the Budget. We have reduced our expenditures, rather, we have reduced our obligations in the OECD countries to 50 percent of the 1963 level. In the process of doing this, we have obtained unfavorable reactions.

Now, the only implication of this should be not that we have any obligations to continue but, rather, that we must be conscious of State Department policies. We must cooperate with the State Department and that we must make our reductions in such a manner as to minimize the adverse reaction.

MR. REUSS. Well, I am glad you want to cooperate with the State Department which flutters around ineffectually on balance of payments, but I wish you would cooperate a little more with the Treasury

which has the hard task of bringing them into balance. A man cannot serve two masters here. It seems to me you ought to go to the President and see who is boss on this.

Dr. LARSEN. A couple of the actions we have taken in this regard, the reductions in the OECD countries with the barter agreements for example, have made a very significant improvement on the balance of payments.

Mr. REUSS. As I say, I don't see it.

Dr. LARSEN. That is the data we will supply.

Mr. REUSS. I would be pleased to hear the good news. However, I do think that you should bear in mind that the State Department traditionally never wants to offend any foreigner, and hence inevitably they are going to advise you; "Oh, don't cut off your research to little Iceland. They are fine people. We want to have good relations with them." And indeed they are and indeed we do, but we aren't going to have relations with anybody anywhere if we don't get our balance of payments in order.

So I hope you listen to the Treasury at least as much as you listen to State.

Dr. LARSEN. We will listen to both the Treasury and to you, Mr. Reuss.

Mr. REUSS. Let me go on reading from your statement. There is another thing here that worries me. You say:

There is another interesting aspect to international affairs arising from gold flow reduction policies or lack of mutual agreement on actions undertaken. We know, from a national security point of view, that our strongest potential allies are those with strong and healthy economies and possessing advance science and technology capabilities. Too rapid a rise in any one scientific field or in any special technological field in the United States has often led to the "brain-drain" phenomenon, that is, the weakening of the scientific or technological potential of other nations. We know that this has happened in the past in medicine, in physics, and in aerodynamics. Similarly "brain drain" can be expected to occur in these or other fields if we precipitously reduce foreign support and try to suddenly replace it in the United States. I have been told that this phenomenon has actually been detected in the field of psychology during the last 2 years. We reduce our support in Canada at the very time when U.S. universities were attempting to build up in this field; and what appeared to be a "brain drain" from Canada resulted.

This really describes the whole Alice-in-Wonderland policy that we are pursuing. The Federal Government spends \$16 billion a year on research and development in this country. This sets up a very lively research potential throughout the country, and as a result, people are attracted to it, both Americans and foreign nationals. That is the point of it. This has been criticized abroad as a "brain drain," but the thought is quite clear in what you say there. We are now going to work at cross purposes with ourselves and help prevent the "brain drain" by giving foreign countries money so that they can bid up the price of scientists more and keep them from being drained to the United States. This, I suggest, is right out of "Alice in Wonderland." We are chasing our tail here; are we not?

Dr. LARSEN. May I comment on that? It is well known that there have been large numbers of excellent scientists coming from most of the European countries and Canada to the United States. A considerable amount of this I heartily applaud. At various times I have employed some of these men. They are most excellent and they have been an asset to the United States and our own scientific development.

If it goes too far, then we do, or may, literally in the long term damage our NATO Allies; and the Department of Defense is interested in having a strong NATO, in mutual defense; in having Western European countries contribute to their own defense by creating their own weapons systems and in doing the research that leads to those weapons systems.

So I think there is a very unfortunate use of the word "interest" in the introductory sentence which you read. I request its deletion. The "brain drain" is an aspect that ought to be considered and I believe that it is a valid consideration to maintain a stronger Europe. I do not for one moment propose to stop the flow of scientists to the United States. We couldn't. I am sure it will continue.

Mr. REUSS. Thank you. Let me turn now to the criteria set up in 1964 by the Federal Council on Science and Technology for minimizing dollar drain from U.S. support of foreign science.

The guidelines set forth disallow all projects which "cannot be carried out effectively in this country."

Now, I notice when the National Institutes of Health came to promulgate that guideline, instead of passing out what the Federal Council on Science and Technology had directed, it wrote its own guideline, considerably watering it down. For example, the Federal Council guideline says no project except "where it is one that cannot be carried out effectively in this country." NIH rewrote it so as to say no project except "where it is not likely to be readily available to the United States."

That is a gross dilution of the guideline, and let me ask you, Dr. Shannon, did the Federal Council of Science and Technology ever complain at the nonobservance of it by—

Dr. SHANNON. Mr. Reuss, I don't see such a drastic difference in the wording—in relation to a specific grant activity.

Mr. REUSS. The words will have to speak for themselves. Did the Federal Council ever complain?

Dr. SHANNON. No, sir.

Mr. REUSS. Did the Bureau of the Budget ever complain?

Dr. SHANNON. No, sir.

Mr. REUSS. Did the Office of Science and Technology ever complain?

Dr. SHANNON. No, sir; and it should be noted that the NIH issuance (PPO 51) predated the guidelines issued by the Federal Council for Science and Technology: June 29, 1964, for PPO 51 and August 7, 1964, for the Federal Council guidelines.

Mr. REUSS. Let me turn now to the National Science Foundation. I detect considerable watering down, dilution there, too. The Federal Council guideline says no projects except those which "cannot be carried out effectively in this country, and when NSF came around to writing it, it said the project must be one which "can be carried out more effectively by foreign institutions than by an institution in the United States."

Did the Federal Council ever complain to NSF that it had diluted their guidelines?

Dr. WILSON. No. As a matter of fact, I thought we were making it just slightly more stringent when it says more effectively.

Mr. REUSS. Well, again, each of us will have to read those words for ourselves.

How about the Bureau of the Budget? Did they ever gripe?

Dr. WILSON. No.

Mr. REUSS. The Office of Science and Technology?

Dr. WILSON. No.

Mr. REUSS. Now, I have studied the statutes which are referred to by each of the agencies that are here today as justifying foreign science expenditures and the only statute of the five agencies here represented which specifically uses the words "foreign countries" and indicates that it was in Congress mind that we were authorizing foreign expenditures is the statute establishing the National Science Foundation.

Let me ask the Department of Defense, the AEC, the Space Agency, and the Department of Health, Education, and Welfare whether there is anything specific in your statutes which mentions the word "foreign." I don't find any.

Mr. KELLY. With respect to the Department of Health, Education, and Welfare, the first statute which we quoted was the International Health Research Act of 1960, and it expressly refers to "foreign countries as they may deem desirable and necessary."

Mr. REUSS. Thank you. I stand corrected on that.

How about Department of Defense?

Dr. LARSEN. The Department of Defense is acting under Public Law 85-934, an act to authorize the expenditure of funds through grants for the support of scientific research and for other purposes.

That act to my knowledge apparently does not name foreign countries as possible recipients and neither does it exclude it.

Mr. REUSS. That is right. It allows you to conduct research—

at nonprofit institutions of higher education or nonprofit organizations whose primary purpose is the conduct of scientific research.

Congress has shown in the statutes relative to the National Science Foundation and the HEW that when it does want to authorize foreign research, it knows how to use the English language to do so by saying "foreign research." Have you ever asked the Attorney General or the Comptroller General for an opinion as to whether the Department of Defense has a congressional authorization for this foreign research?

Dr. LARSEN. To the best of my knowledge we have not, Mr. Reuss.

Mr. REUSS. Let me turn now to the Atomic Energy Commission.

STATEMENT OF DR. SPOFFORD G. ENGLISH, ASSISTANT GENERAL MANAGER FOR RESEARCH AND DEVELOPMENT, U.S. ATOMIC ENERGY COMMISSION

(The prepared statements of Dr. Spofford G. English and the U.S. Atomic Energy Commission are as follows:)

PREPARED STATEMENT OF DR. SPOFFORD G. ENGLISH, ASSISTANT GENERAL MANAGER FOR RESEARCH AND DEVELOPMENT, U.S. ATOMIC ENERGY COMMISSION

Mr. Chairman and members of the committee, you have before you the Atomic Energy Commission's statement prepared in response to your request of January 14, 1966. As your letter suggested, I would like to take a few minutes to summarize that statement and to describe to you our rationale for the support of research abroad by foreign scientists.

Excluding the use of excess currency funds and expenditures in the United States for the Atomic Bomb Casualty Commission, in fiscal year 1965 the AEC incurred accrued operating costs and equipment and construction obligations of \$3,334,000 for foreign research. Our fiscal year 1966 estimate is a total of \$3,282,000. We believe that these expenditures are at the minimum level consistent with our obligations to perform nuclear research and development as set forth in the Atomic Energy Act.

The Commission staff has participated in the discussions held by the International Committee of the Federal Council for Science and Technology since their inception in 1961. As you know, the Federal Council approved the Committee's statement entitled "Policy Guidance for Research Investment Abroad by U.S. Agencies," and Dr. Hornig subsequently forwarded it to the AEC for implementation in September 1964. This document, we believe, provides proper and adequate guidance on this subject. Even prior to the adoption of this statement we, in the AEC, essentially followed such guidelines. I should explain the all of our foreign research contracts are awarded by our Division of Biology and Medicine, chiefly for the support of research projects which will contribute significantly to knowledge relating to the biological effects of radiation, although these are few in comparison with the research supported in the United States. A few contracts for foreign development work, not included in these totals, are awarded by our Division of Reactor Development and Technology in order to take advantage of unique opportunities abroad.

We have two main reasons for these contracts in foreign countries. The first is that there exist outside our borders unique natural conditions, unusual materials or specialized facilities for the conduct of research essential to our mission. The work of the Atomic Bomb Casualty Commission in Japan, performed under an AEC contract with the U.S. National Academy of Sciences is an excellent illustration. In order to study the biological and medical effects of the radiation and radioactivity from the detonation of a nuclear explosive on man we must of necessity conduct this work in the only locations where these effects have occurred—in Nagasaki and Hiroshima. This study was originally suggested by the late James Forrestal, Secretary of the Navy, and approved by President Truman on November 26, 1946. The record of accomplishment of the ABCC to date is significant but, because of the long-term nature of the problem, we anticipate that it should be continued for many more years. In addition to the complete support of the project by the Japanese National Institute of Health, the Japanese Government is contributing the salaries of about 35 Japanese scientists to the project.

The second major reason for our support of research abroad is to take advantage of unusually well qualified or unique scientific talents not available in the United States and which are deemed necessary to the effective conduct of our research and development responsibilities. An illustration of this situation is the work being done by Dr. Bruno Schreiber at the University of Parma in Italy, sponsored by the International Atomic Energy Agency (IAEA) through the U.S.-IAEA research contract program. Dr. Schreiber and his coworkers are studying *Acantharia*, a class of unicellular marine animals, which are the only organisms known to have a physiological demand for strontium—they make their skeletons out of trontium sulfate. This contract supports a unique team of world authorities on these organisms. They are investigating the life histories, ecology, physiology, and specifically the role of *Acantharia* in the biogeological cycling of stable and radioactive strontium in the sea.

I can assure you that each one of our foreign research contracts receives a most thorough review each year. Projects are terminated if it appears that the work could be conducted in the United States, if the work is no longer deemed necessary to the conduct of our program or if it becomes of lower priority.

I would like to mention that our total research and development operating costs for fiscal year 1965 were \$1.24 billion and of this amount one-quarter of 1 percent (0.25 percent) was spent abroad. I have indicated that we have kept our level of research abroad to the minimum consistent with our mission. We have done more. We have cooperative research and development arrangements with Canada and with Euratom in the reactor development areas. In these two instances we have joined these groups in cooperative R. & D. programs in areas of mutual interest. The agreement with Euratom, for instance, which was initiated in February 1959, has, through 1965 resulted in our support of \$21.6 million worth of research in the United States while the Euratom community has authorized \$29.2 million for research in its member countries. This is a mutually

beneficial arrangement in which both groups share in the results of the research but keeps our expenditures within the United States. While not research and development, I might also mention, in closing, that the Commission's uranium ore procurements abroad have been steadily decreasing so that we expect that fiscal year 1967 will be the last year for such expenditures abroad.

My colleagues and I would now be pleased to answer any questions you may have.

STATEMENT IN RESPONSE TO QUESTIONS RAISED BY SUBCOMMITTEE LETTER DATED
JANUARY 14, 1966

This statement has been prepared in response to a letter dated January 14, 1966, from Congressman Henry Reuss, Chairman of the Research and Technical Programs Subcommittee to Dr. Glenn Seaborg, Chairman of the U.S. Atomic Energy Commission inquiring about various aspects of support of research abroad conducted by foreign scientists. This statement sets forth specific answers to the seven questions contained in Mr. Reuss' letter.

Question 1. What have been and are estimated to be the amounts of obligations for research abroad by foreign scientists in such programs for the years 1962 through 1966? Please give the total amounts of such support and the amounts less Public Law 480 support.

Answer. Table I gives fiscal year 1962 through fiscal year 1966 accrued AEC operating costs and equipment and construction obligations for research performed abroad by foreign scientists under AEC contracts. (Under the Commission's budget and accounting system, accrued operating costs are reported instead of obligations.) It should be noted that of these totals, \$989,000 and \$914,000 for fiscal year 1965 and fiscal year 1966, respectively, were spent in the United States for work of the Atomic Bomb Casualty Commission in Japan.

Table II provides the total amounts of foreign research and development supported with excess foreign currencies.

Question 2. What are the amounts of such support which have been and are estimated to be given to foreign scientists in the developed countries (the countries of the OECD, Australia, New Zealand, and South Africa)?

Answer. Table III indicates those amounts set forth in table I which funded research contracts in the developed countries indicated. It should be noted that of these totals, \$989,000 and \$914,000 for fiscal year 1965 and fiscal year 1966, respectively, were spent in the United States for work of the Atomic Bomb Casualty Commission in Japan.

Question 3. Under what specific statutory authority are such grants made? Please quote from the statute.

Answer. All of AEC's support for research abroad, summarized in table I, is performed under contract with the AEC. The specific statutory authority for conducting this research is contained in the Atomic Energy Act of 1954, as amended, pertinent portions of which are quoted below. The principal such section is section 31, which provides authority with respect to research conducted for the benefit of the Commission's programs.

"SECTION 1. DECLARATION.—Atomic energy is capable of application for peaceful as well as military purposes. It is therefore declared to be the policy of the United States that—

"a. the development, use, and control of atomic energy shall be directed so as to make the maximum contribution to the general welfare, subject at all times to the paramount objective of making the maximum contribution to the common defense and security; and

"b. the development, use, and control of atomic energy shall be directed so as to promote world peace, improve the general welfare, increase the standard of living, and strengthen free competition in private enterprise.

"SEC. 3. PURPOSE.—It is the purpose of this Act to effectuate the policies set forth above by providing for—

"a. a program of conducting, assisting, and fostering research and development in order to encourage maximum scientific and industrial progress;

* * * * *

"d. a program to encourage widespread participation in the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the common defense and security and with the health and safety of the public;

"e. a program of international cooperation to promote the common defense and security and to make available to cooperating nations the benefits of peaceful applications of atomic energy as widely as expanding technology and considerations of the common defense and security will permit; * * *

* * * * *

"SEC. 31. RESEARCH ASSISTANCE.—

"a. The Commission is directed to exercise its powers in such manner as to insure the continued conduct of research and development and training activities in the fields specified below, by private or public institutions or persons, and to assist in the acquisition of an ever-expanding fund of theoretical and practical knowledge in such fields. To this end the Commission is authorized and directed to make arrangements (including contracts, agreements, and loans) for the conduct of research and development activities relating to—

- "(1) nuclear processes;
- "(2) the theory and production of atomic energy, including processes, materials, and devices related to such production;
- "(3) utilization of special nuclear material and radioactive material for medical, biological, agricultural, health, or military purposes;
- "(4) utilization of special nuclear material, atomic energy, and radioactive material and processes entailed in the utilization or production of atomic energy or such material for all other purposes, including industrial uses, the generation of usable energy, and the demonstration of the practical value of utilization or production facilities for industrial or commercial purposes; and
- "(5) the protection of health and the promotion of safety during research and production activities.

"b. The Commission is further authorized to make grants and contributions to the cost of construction and operation of reactors and other facilities and other equipment to colleges, universities, hospitals, and eleemosynary or charitable institutions for the conduct of educational and training activities relating to the fields in subsection a.

"c. The Commission may (1) make arrangements pursuant to this section, without regard to the provisions of section 3709 of the Revised Statutes, as amended, upon certification by the Commission that such action is necessary in the interest of the common defense and security, or upon a showing by the Commission that advertising is not reasonably practicable; (2) make partial and advance payments under such arrangements; and (3) make available for use in connection therewith such of its equipment and facilities as it may deem desirable.

* * * * *

Question 4. Has the attention of the Congress been called to the existence of these foreign contracts? If so, when and in what context? Please give specific citations. Do such amounts appear separately in the budget submissions to Congress?

Answer. The Atomic Energy Commission does not separately identify amounts for research abroad in its budget submissions to Congress. Reference has been made annually, in the appendix to the budget of the U.S. Government, to the support of the Atomic Bomb Casualty Commission which operates in Japan. This is (and has been) the Commission's largest contract for research abroad. For example, appendix to the fiscal year 1966 budget of the U.S. Government, page 743, paragraph 6, states:

"The program includes the operation of several facilities in the United States devoted to cancer research and, through the National Academy of Sciences, in Japan for the determination of long-term effects of atomic bomb radiation on the affected population."

Reference to research conducted abroad has been made in past years during the presentation and testimony in authorization hearings before the Joint Committee on Atomic Energy and in appropriation hearings before the House Appropriations Committee. Such references generally have been for the purpose of explaining the content of the Commission's research and development program rather than to identify specifically that the research is being conducted by foreign scientists abroad. Reference was also made to our support of research abroad in response to a question posed by the Subcommittee on Science, Research, and Development of the House Committee on Science and Astronautics in connection with its hearings relating to the distribution of Federal funds (see p. 169

of No. 4 of the subcommittee hearings on "Government and Science," May 5-June 4, 1964).

In addition, we provide data to the National Science Foundation each year on our support of research abroad. This information is published annually in their publication Federal Funds for Research, Development, and Other Scientific Activities.

Question 5. What restrictions or policy instructions on the permissible amounts of such grants or contracts have you received? Please cite specifically and indicate how and when they were put into effect.

Answer. The Atomic Energy Commission has not received any instructions which specifically limit the dollar amounts for contracts for research abroad. The following policy instructions which set forth criteria and guidelines have been received:

(a) Bureau of the Budget Circular No. A-58 (revised July 7, 1964). This circular sets forth policies and procedures for continuation of the system for reviewing and controlling international transactions of the Federal Government, to provide a means for improving the U.S. balance-of-payments situation.

This circular, upon receipt by AEC, was distributed to all regular AEC organization components for implementation.

(b) Bureau of the Budget Bulletins 65-5 (September 15, 1964) and 66-1 (July 2, 1965) relating to use of excess and near-excess foreign currencies were distributed to all regular AEC organizational components upon receipt. The Director of the Bureau of the Budget was advised by letter dated September 25, 1964 of AEC action on Bulletin 65-5. Supplemental AEC instructions on the use of excess and near-excess foreign currencies were issued by memorandum of December 10, 1964. Bulletin 66-1 was distributed for implementation after it was received.

(c) The International Committee of the Federal Council for Science and Technology (FCST) developed a document entitled "Policy Guidance for Research Investment Abroad by U.S. Agencies." This document was approved by the FCST on August 18, 1964, and was amended in December 1964. Dr. Hornig, chairman, FCST, forwarded this document to the Chairman of the AEC on September 21, 1964. The document was circulated for the information of the principal headquarters staff on September 24, 1964, and was forwarded to the appropriate headquarters program divisions for implementation on October 2, 1964.

The Commission has had no difficulty in implementing the above-mentioned directives. As a matter of fact, the general principles set forth regarding support of research abroad had been generally followed by the Commission prior to issuance of these directives.

Question 6. Have any additional restrictions been put on these grants by your department or agency?

Answer. In the past several years, in informal reviews of the agency's budget with the Bureau of the Budget, considerable attention has been given to the level and justification for contracts for research abroad. Special reviews are made from time to time. For example, a very detailed review was made by the Commissioners in May 1965 of the Atomic Bomb Casualty Commission program. This review was, in large part, motivated by the balance-of-payment problem. The Director of the Bureau of the Budget was advised of the outcome of that review in a letter dated June 3, 1965, and the Bureau concurred in the need for the continuance of the program.

For a number of years, the AEC's Division of Biology and Medicine has applied the following criteria to its review of foreign research proposals: foreign research projects are approved only if they can meet the test of uniqueness, are necessary to the Atomic Energy Commission program, and cannot be equally well performed within the United States.

Question 7. What additional measures could be taken by your department or agency to reduce the amounts of these grants or contracts?

Answer. The Commission's internal review procedures provide for very close scrutiny of each proposed contract for research and development by foreign scientists abroad. In our opinion, the dollar level of such contracts is the minimum practicable for the effective conduct of the Commission's responsibilities as set forth in the Atomic Energy Act, as quoted above.

We believe that any additional measures to reduce the amount of our contracts abroad would be detrimental to our needs, and would need to be arbitrary rather than logical.

U.S. ATOMIC ENERGY COMMISSION

TABLE I.—*Support of research in foreign countries*

[In thousands]

	Fiscal year 1962	Fiscal year 1963	Fiscal year 1964	Fiscal year 1965	Fiscal year 1966
Operating cost ¹	\$3, 254	\$3, 685	\$3, 827	\$4, 029	\$4, 168
Plant and capital equipment obligations..	115	102	159	351	200
Total.....	3, 369	3, 787	3, 986	² 4, 380	² 4, 368

¹ These figures reflect "accrued costs" rather than "obligations" in line with the budget and accounting system of the Commission.

² Includes \$989 in fiscal year 1965 and \$914 in fiscal year 1966 for expenditure in the United States for the Atomic Bomb Casualty Commission.

TABLE II.—*Foreign research and development supported under excess foreign currencies* ¹

[In thousands]

	Fiscal year 1962	Fiscal year 1963	Fiscal year 1964	Fiscal year 1965	Fiscal year 1966
Operating ²				\$57	\$172

¹ Payments for these items are made in accordance with the provisions of BOB Bulletins 65-5 and 66-1, "Excess and near excess foreign currencies." One source of excess currencies is Public Law 480 funds.

² The figures reflect "accrued costs" rather than "obligations" in line with the budget and accounting system of the Commission.

TABLE III.—*Foreign research supported in developed countries*

[In thousands]

	Fiscal year 1962	Fiscal year 1963	Fiscal year 1964	Fiscal year 1965	Fiscal year 1966
Operating costs ¹	\$3, 145	\$3, 359	\$3, 539	\$3, 689	\$3, 776
Plant and capital equipment obligations..	115	102	159	351	200
Total.....	3, 260	3, 461	3, 698	² 4, 040	² 3, 976

¹ These figures reflect "accrued costs" rather than "obligations" in line with the budget and accounting system of the Commission.

² Includes \$989 in fiscal year 1965 and \$914 in fiscal year 1966 for expenditure in the United States for the Atomic Bomb Casualty Commission.

Mr. REUSS. Is there anything in your law which enables you to spend money overseas? I have read it and can't find any.

Dr. ENGLISH. Let me read two sections, Chairman Reuss, that I would quote as our interpretation giving us the authority to do this. In both of these—the first two I will read—the word "international" is not used. The first is paragraph (a) of section 3 of the Atomic Energy Act of 1954, the title of which is "Purpose." And paragraph (a) reads:

A program of conducting, assisting, and fostering research and development in order to encourage maximum scientific and industrial progress.

In that same section, paragraph (d) reads:

A program to encourage widespread participation in the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the common defense and security and with the health and safety of the public.

Now, paragraph (e) does mention the word, or paragraph (e) is different in that it does mention the words "international cooperation." It reads:

A program of international cooperation to promote the common defense and security and to make available to cooperating nations the benefits of peaceful applications of atomic energy as widely as expanding technology and considerations of the common defense and security will permit.

Mr. REUSS. You have never asked the Attorney General or the Comptroller General whether that statute permits you to engage in foreign research?

Dr. ENGLISH. I simply cannot answer your question, Mr. Reuss. I will be glad to supply that information for the record.

(The information referred to is as follows:)

U.S. ATOMIC ENERGY COMMISSION,
Washington, D.C., March 7, 1966.

HON. HENRY S. REUSS,

Chairman, Research and Technical Programs Subcommittee of the Committee on Government Operations, House of Representatives.

DEAR MR. REUSS: At the hearings of the Research and Technical Programs Subcommittee of the House Government Operations Committee of February 10, 1966, you raised the question whether AEC had ever asked the Attorney General or the Comptroller General if our statute (the Atomic Energy Act of 1954, as amended) permits us to engage in foreign research. As far as we have been able to determine neither the Comptroller General nor the Attorney General has ever been specifically asked to consider this question. However, there seemed to have been no intent on the part of Congress, in the Atomic Energy Act, to limit the Commission's research and development programs to the use of domestic technical talent. There is no specific language or implication of a geographical limit on the applicability of section 31. Section 1 and section 3 (a) and (d) are broad in scope and impose no geographical limits. Section 3(e) clearly recognizes that a foreign program could promote the common defense and security of the United States. Moreover, our limited use of foreign research contracts is well known to the Joint Committee on Atomic Energy and the Comptroller General. Neither the committee nor the Comptroller General has ever questioned the authority of the AEC to enter into such contracts.

Sincerely yours,

S. G. ENGLISH,
*Assistant General Manager
for Research and Development.*

Mr. REUSS. NASA, as I read your statute, it likewise does not have any specific language permitting foreign research.

**STATEMENT OF DR. THOMAS L. K. SMULL, SPECIAL ASSISTANT TO
THE ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE
ADMINISTRATION**

(The prepared statement of Dr. Smull is as follows:)

PREPARED STATEMENT OF DR. THOMAS L. K. SMULL, SPECIAL ASSISTANT TO THE
ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Mr. Chairman, and members of the committee, it is a pleasure to have the opportunity to appear before you today to discuss NASA's current research activities abroad, with particular attention being given to the dollar outflow that results from research being carried on by foreign scientists under NASA grants and research contracts.

The research carried on by scientists in foreign countries that is financed by NASA grants and research contracts generally falls into one or two direct program related types of activities: (1) those studies that can only be conducted outside the United States because of geographical factors. For example, astro-

nomical investigations that require observations from the Southern Hemisphere, or (2) investigations that are intimately related to NASA program objectives for investigations for which competence does not exist within the United States or that that competence that lies outside the United States is so superior that it would be considered deleterious to NASA program objectives not to avail itself of such competence.

In those investigations where a specific NASA program requirement exists and this requirement cannot, as a practical matter, be met in the United States, efforts are first made, through the Office of International Programs, to establish a cooperative basis for the undertaking. If this is neither feasible nor possible, NASA may then enter into the direct financing of such research by grant or research contract.

In the fiscal year 1962 NASA obligated an estimated \$226,850 for seven overseas investigations. In fiscal year 1963 it obligated \$364,820 for the support of 11 investigations in foreign universities and technical institutes. In fiscal year 1964 NASA obligations for such activities dropped to \$290,924 in 11 institutions. In fiscal year 1965 obligations for such activity dropped to \$161,829 at 12 institutions.

It is estimated that its fiscal year 1966 obligations will be about \$200,000. None of the above listed activities are supported by funds that are acquired through Public Law 480. The authority for entering into grants and research contracts, including those involving foreign scientists, is contained in section 203(b)(5) of the National Aeronautics and Space Act of 1958, as amended.

NASA has been conscious of the balance-of-payments question for sometime and in fact had issued, on November 19, 1964, Management Manual Instruction 9393.1 entitled "NASA Transactions Entering the International Balance of Payments." This is a policy and operating instruction regarding the consideration to be given to this question. This instruction contains no dollar limitation. Even prior to this, consideration had been given, within NASA, to the specific problems we are discussing here today; namely, that of the support of research abroad, and on December 31, 1962, the following policy statements were circulated within NASA to the operating units concerned with the sponsorship of research:

Grants and research contracts abroad are not to be encouraged except where a specific NASA program requirement exists and this requirement cannot, as a practical matter, be met in the United States.

If a NASA program requirement for overseas research is established, an effort will be made through the Office of International Programs, to establish a cooperative basis for the support of the proposal.

With one exception, all the foreign scientists whose research has been financed by NASA grants and research contracts have resided in the developed countries. Grants and research contracts made to foreign institutions are listed in NASA's semiannual report to the Congress. For example, NASA's 12th Semi-Annual Report to the Congress, July to December 1964, page 234.

I have referred above to our efforts to establish a cooperative basis for any program requirement prior to entering into a grant or research contract for a foreign scientific service. I would like to note that the great preponderance of NASA's international activities are conducted on a cooperative basis. In these cooperative programs NASA does not finance foreign activities and, consequently, does not export dollars. The respective responsibilities of the cooperating parties are funded independently so that a literal cooperation is achieved. The committee may be interested to know that under such cooperative programs six satellites have been prepared abroad without cost to us and have then been launched by us. Eight more cooperative satellites have been agreed for foreign launchings and a wide variety of similar projects is carried forward on the same general basis.

Dr. SMULL. The National Aeronautics and Space Act states that it shall be one of the objectives, and I quote:

Cooperation by the United States with other nations and groups of nations with work done pursuant to this act and in the peaceful application of the results thereof.

The specific authority is contained in section 203(b)(5) of the Space Act.

Mr. REUSS. You read that as meaning we can pay them for their cooperation?

Dr. SMULL. Based on our specific authority, yes. The statement I quoted is one of the Space Act objectives. I think that you, Mr. Chairman, from our testimony will find that the great base of our international activity is on a bilateral agreement arrangement and that such things as we do support in the research activities abroad are those things that we consider to be essential to the conduct of our mission.

Mr. REUSS. Have you ever asked the Attorney General or the Comptroller General for an opinion as to whether foreign research is within the statutory powers of NASA?

Dr. SMULL. To my knowledge I believe we have not. I would have to check this.

Mr. REUSS. If you will do that.

Dr. SMULL. I will, sir.

(NASA's General Counsel has provided the following statement of the agency's authority to make loans and grants for scientific investigations abroad:)

NASA regards its basic legislation, the National Aeronautics and Space Act of 1958, as amended, 42 U.S.C. 2451 et seq., as containing sufficient authority for engaging in appropriate research activities in foreign countries. Subsection 203(b)(5) of the act (42 U.S.C. 2473(b)(5)) authorizes NASA 'to enter into and perform such contracts * * * cooperative agreements, or other transactions as may be necessary in the conduct of its work * * * with any person, firm, corporation, or educational institution.' When this authority is considered with the broadly conceived functions of NASA set forth in subsection 203(a) of the act (42 U.S.C. 2473(a)) and the equally broad objectives of the act in section 102(c) thereof (42 U.S.C. 2451(c)), it is quite evident that authority to contract with foreign entities is present.

In view of the foregoing, we have not found it necessary to seek the opinion of either the Attorney General or the Comptroller General on this matter.

Mr. REUSS. Mr. Rosenthal?

Mr. ROSENTHAL. Dr. Larsen, in fiscal year 1965 you have got \$39,000 programed for South Africa, and in 1966, \$30,000. Can you tell me what projects those items are for?

Dr. LARSEN. May I call on Dr. Reilley, one of my colleagues here? Can you—there is a request for information about research in South Africa, Dr. Reilley.

Dr. REILLEY. I didn't bring the detailed file with us. We can supply it for the record.

Dr. LARSEN. May we supply that for the record?

Mr. ROSENTHAL. Yes. I would appreciate it if you, in addition to submitting it for the record, would send me personally a copy.

Dr. LARSEN. Yes, indeed, Mr. Rosenthal.

(The information referred to is as follows:)

The research programed for South Africa consists of two projects sponsored by the Department of the Army. The larger of the two is an environmental study under the direction of Dr. C. Koch of the Namid Desert Research Association, Pretoria, funded at \$22,000 in 1965. This research is being supported in order to determine the degree of analogy between the Namid desert and the environment available at the Yuma Test Station at Yuma, Ariz., as one step in determining the extent to which the Yuma is typical of world deserts. The research on the Namid desert consists of an extended set of measurements of wind, airborne matter, dew and fog, and of solar radiation from the interior of the Namid desert to the coast. The research data being obtained is sent to the U.S. Army Natick Laboratories where it can be used in establishing a simulated African desert climate in their enclosed simulation chambers, in which materials such as uniforms and combat equipment may be tested and measurements can be made on

soldiers of the effects of environmental stress upon their performance by professional physiologists.

The second project is a study in environmental biology directed by Dr. C. H. Wyndham of Witwatersrand University of Johannesburg. This research consists of a comparative analysis of the metabolic reactions of some of the larger animals, including the baboon, when exposed to the cold; paying particular attention to their tolerance or resistance of the cold and their susceptibility to frostbite. The metabolic reactions of the rat to cold have been identified in previous research work. Studies on higher order animals more nearly approximating man have not yet shown which might be the more suitable animal for simulating the combat soldier in experimental work on cold stress physiology, or climate adaptation and the associated metabolic function. The contract obligation for this research in fiscal year 1965 was \$17,000.

Mr. REUSS. Mr. Dickinson?

Mr. DICKINSON. Nothing.

Mr. REUSS. Mr. St Germain?

Mr. ST GERMAIN. Dr. Larsen, when I read your title, it is Deputy Director of Defense Research and Engineering, Department of Defense, and I heard the chairman read off some grants, examples of grants, and the last one that I heard the chairman read off was to Dr. Terzi, I believe, someplace in Italy, for an analysis of the English sentence?

Mr. REUSS. Automatic English sentence analysis, which I think has something to do with preparing translations for computerization. Perhaps the witness can explain that.

Dr. LARSEN. That is quite correct. It so happens that the Italian investigator in this case has a unique approach. Attempts have been made to obtain computerized translations from one language to another for at least 10 years in the United States and a great many efforts have been made in the last 6 or 7 since computers have been readily available. None of these has been satisfactory.

In this case we have—we apparently do not have new, unique ideas in the field in the United States. This Italian investigator did have, and that is exactly what was being supported.

Mr. ST GERMAIN. Was any thought given to inviting the good doctor over here to work in one of our research centers with our highly sophisticated computers?

Dr. LARSEN. I cannot answer that. I would rather doubt it. I would imagine that work of this nature is seldom a one-man operation. Undoubtedly the Italian investigator is supported by his own staff, that he is accustomed to working with, and his own computer, and he would have to undergo some retraining if the computer were of a different type, and I think the loss of his staff would be more critical to him.

Mr. ST GERMAIN. Another one was something about the study of perspiration of the Australian aborigines. I wonder what impact that might have on our national defense.

Dr. LARSEN. The study is a little broader than appears only from the title, which uses the term "perspiration." It is a study of how man can get along with very small amounts of water. The total water consumption of the Australian aborigines is very small. This certainly may be of genuine significance to our troops in certain parts of the world. Obviously not in Vietnam. But we do attempt to learn how to get along for our troops in a wide variety of climates, climatic conditions, and the study is literally an investigation of the water

balance of a man and how best to survive which can be of interest to pilots shot down or for small bodies of troops subjected to very dry and arid conditions.

Mr. ST GERMAIN. I agree with you, Doctor, that the title is misleading.

Dr. LARSEN. The title is misleading; yes.

Mr. REUSS. Thank you, gentleman.

I will ask that each of you submit for the record, that is, each of the five agencies or departments, submit for the record a list of your science offices abroad, the number of persons employed in each such office, the cost of operating each of these offices—make it fiscal 1965—and the science activities in which each such office is engaged. Some of you covered parts of that in your statement. I think we should have it in a little bit more complete fashion.

(The information referred to is as follows:)

NATIONAL INSTITUTES OF HEALTH OVERSEAS SCIENCE OFFICES

In 1960 the Congress enacted Public Law 86-610, the International Health Research Act of 1960, which was intended to advance the status of the health sciences in the United States and thereby the health of the American people through cooperative endeavors with other countries in health research and research training. With the authorization of the Surgeon General, Public Health Service, the Director of the National Institutes of Health established in 1961 an Office of International Research which would be responsible for the coordination, policy formulation and analysis of NIH international programs and activities. In order to carry out these responsibilities, as well as responsibility for developing and directing a program of scientific cooperation with other countries, the National Institutes of Health established three small overseas offices in the United States Embassies in Paris, France; Tokyo, Japan; and Rio de Janeiro, Brazil.

Representatives for the overseas offices have been selected primarily for their scientific education and experience in the biomedical sciences. Other qualifications of selection are their ability to direct or assist in the direction of the office in carrying out these responsibilities; an ability to perceive and report on scientific situations warranting the attention of NIH; an ability to promote the program objectives of NIH in carrying out its domestic-oriented mission; and an ability to serve as a communication link between the American and foreign scientific communities in the biomedical field.

In assisting the National Institutes of Health to carry out its mission, the overseas offices of the agency have played a significant role as reflected by the following activities:

1. Identification of the research capabilities of scientific staffs and institutions

During the past 4 or more years of their existence the personnel of the overseas offices have maintained contact with most of the principal centers of scientific research throughout the world, seeking information for the program directors of NIH in those specialized areas of research of interest to the American scientist working on health-related problems. Through such means, the American scientist was made aware of and often put in touch with these foreign research efforts. In the course of these contacts, foreign scientists preparing to place their research projects before the American committees judging scientific merit for NIH were given a comprehensive estimate of the need for program relevance and order of merit necessary for consideration in the competition for the small amount of funds available for research in other countries. In order to do this the overseas NIH scientific representatives required a depth of knowledge of U.S. program requirements and the capability of making a preliminary evaluation of the work of the foreign scientists. Benefits to the American research program from such foreign contacts was also derived through the training programs and facilities in foreign institutions made available to American scientists who eventually found their way to these centers of scientific excellence. In this manner, the overseas offices facilitated in a concerted, opportune, and

more economical manner the acquisition of foreign scientific and technological information which was absorbed and brought to the United States by such trainees and fellows.

2. Participation in the grants process

The NIH overseas representative has played a significant part in the procedure involving the review and processing of foreign grant applications. NIH scientific study sections use the overseas offices to provide supporting information submitted by applicants from other countries. This information might include the scientific background of persons to be employed on the project, the need for certain types of scientific equipment requested, and judgment on the type of technique to be utilized. When appropriate, overseas representatives have also been sent at much reduced expense to NIH to participate in project site visits to grantee institutions in other countries in order to report their views to the NIH. Following award of foreign research grants, overseas representatives have made periodic visits to the grantee institutions as a means of maintaining contact with the foreign scientists. Such visits have also served to facilitate the communication link between the foreign scientist and his American counterpart.

3. Furtherance of Government-to-Government scientific collaboration

During the past several years there has been an increasing NIH interest in Government-to-Government scientific collaboration on the planning level which has resulted in an effort by the National Institutes of Health to examine the possibility of coordinating its programing efforts with those of other countries supporting biomedical research. The NIH overseas representatives have assisted in identifying and evaluating these opportunities.

4. Knowledge of foreign biomedical science

Since the inception of the overseas offices, the NIH representatives abroad have developed much valuable information on the national and private organization of medical science, and on the research policies of other countries. This information has been of importance in the formulation, development and coordination of our science policies designed to make the most efficient use of research being carried out abroad.

The overseas offices have also played an important role in bringing to the attention of NIH the great impact of its influence upon foreign scientific communities and in instituting and maintaining American scientific techniques, attitudes, and ideas.

In general, the overseas offices have served as an integral part of the NIH organization, assisting it in doing its job.

NATIONAL INSTITUTES OF HEALTH—OFFICE OF INTERNATIONAL RESEARCH

European office

OC	Fiscal year 1965 obligations			Fiscal year 1966 obligations		
	Paris and London	Bethesda	Total	Paris and London	Bethesda	Total
11 Personal services.....	\$4, 000	\$90, 314	\$94, 314	\$4, 000	\$93, 000	\$97, 000
12 Personnel benefits.....	10, 000	18, 068	28, 068	11, 000	15, 000	29, 000
21 Travel.....	18, 000	6, 457	24, 457	13, 000	7, 000	20, 000
22 Transportation of things...	1, 000	2, 500	3, 500	100	4, 000	4, 100
23 Rent, communications, and utilities.....	1, 800	0	1, 800	700	0	700
24 Printing.....	0	98	98	0	0	0
25 Other contractual serv- ices.....	4, 000	1, 156	5, 156	6, 600	1, 500	8, 100
26 Supplies and materials....	1, 300	132	1, 432	500	500	1, 000
31 Equipment.....	700	0	700	100	0	100
Total.....	40, 800	118, 725	159, 525	36, 000	124, 000	160, 000

Latin America office

OC	Fiscal year 1965 obligations			Fiscal year 1966 obligations		
	Rio	Bethesda	Total	Rio	Bethesda	Total
11 Personal services.....	\$3,000	\$56,740	\$59,740	\$3,500	\$56,700	\$60,200
12 Personnel benefits.....	1,500	6,238	7,738	1,500	6,500	8,000
21 Travel.....	10,000	5,849	15,849	9,000	6,000	15,000
22 Transportation of things.....	0	9,849	9,849	200	10,000	10,200
23 Rent, communications, and utilities.....	1,101	0	1,101	500	0	500
25 Other contractual services.....	1,203	0	1,203	5,000	0	5,000
26 Supplies and materials.....	500	377	877	300	300	600
31 Equipment.....	81	822	903	500	0	500
Total.....	17,385	79,875	97,260	20,500	79,500	100,000

Pacific office

OC	Fiscal year 1965 obligations			Fiscal year 1966 obligations		
	Tokyo and New Delhi	Bethesda	Total	Tokyo and New Delhi	Bethesda	Total
11 Personal services.....	\$4,400	\$58,221	\$62,621	\$5,000	\$56,000	\$61,000
12 Personnel benefits.....	2,150	15,538	17,688	3,000	14,000	17,000
21 Travel.....	5,600	17,442	23,042	6,500	17,000	23,500
22 Transportation of things.....	0	11,578	11,578	0	12,000	12,000
23 Rent, communications, and utilities.....	1,000	0	1,000	1,000	0	1,000
24 Printing.....	0	0	0	0	0	0
25 Other contractual services.....	6,750	710	7,460	7,000	1,700	8,700
26 Supplies and materials.....	700	171	871	1,000	300	1,300
31 Equipment.....	600	0	600	500	0	500
Total.....	21,200	103,660	124,860	24,000	101,000	125,000

Employees

	Fiscal year 1965	Fiscal year 1966
European office.....	4 professional..... 4 support.....	3 professional. 1 professional vacancy. 4 support.
Latin America office.....	3 professional..... 1 support..... 1 local.....	3 professional. 0 support. 1 local.
Pacific office.....	4 professional..... 0 support..... 3 local.....	4 professional. 1 support. 3 local.

NATIONAL SCIENCE FOUNDATION OVERSEAS SCIENCE OFFICES

The National Science Foundation has two offices abroad: one in Tokyo, Japan, and the other in San Jose, Costa Rica, the latter paid for entirely by AID. Detailed information is given below.

NSF SCIENCE LIAISON STAFF, TOKYO, JAPAN

NSF/Tokyo was established in October 1960 primarily for scientific liaison with the Far East, with particular emphasis on Japan, and to improve and extend the international exchange of scientific information in Far Eastern areas

for the purpose of informing the U.S. scientific community on scientific developments there. In 1961 the United States-Japan cooperative science program was started, following conversations between President Kennedy and Prime Minister Ikeda. Since that time, the NSF/Tokyo office has been concerned primarily with liaison duties in connection with this program. It should be emphasized that this program is cooperative both scientifically and financially; the United States pays expenses only for U.S. scientists participating, and all expenses for the Japanese are paid by the Government of Japan.

The staff of NSF/Tokyo consists of two professionals, one U.S. secretary, and three local employees.

Obligations in fiscal year 1965 were the following:

1000-501	Salaries, benefits, allowances-----	\$61,591.17
6300-502	Travel-----	7,799.96
1210-505	Administrative services-----	10,512.09
1250-507	Miscellaneous-----	2,172.44
Total-----		82,075.66

NSF SCIENCE LIAISON STAFF, SAN JOSE, COSTA RICA

NSF/San Jose is responsible for field administration and coordination of the science component of the project, "regional development of the universities of Central America," financed by AID. The staff consists of one professional, one administrative-clerical, and three local employees. Obligations in fiscal year 1965 (exclusive of "in-region" obligations by AID) were the following:

Salaries and benefits-----	\$28,925.33
Travel-----	5,493.53
Miscellaneous-----	3,386.41
Total-----	37,805.27

NSF, in connection with its Antarctic program, has a staff member in Christchurch, New Zealand, every year from October to March to serve as liaison with the NSF-sponsored research teams going to and coming from the Antarctic Continent.

In 1964 the Foundation discontinued staff assignments in Paris (one professional and one clerical) and in Rio de Janeiro (two professionals and one clerical).

DEPARTMENT OF DEFENSE OVERSEAS SCIENCE OFFICES

U.S. ARMY RESEARCH AND DEVELOPMENT GROUP—EUROPE, FRANKFURT, GERMANY

Personnel strength, 20; support costs, \$243,000.¹

Description of science mission: To coordinate and facilitate technical liaison between U.S. Army scientists and European scientists, including the exchange of scientific and technical information, and to coordinate and support research and development efforts of interest to the U.S. Army through contracts with European scientific institutions.

U.S. ARMY RESEARCH AND DEVELOPMENT GROUP—FAR EAST, TOKYO, JAPAN

Personnel strength, 7; support costs, \$52,000.¹

Description of science mission: To coordinate and facilitate technical liaison between Department of Defense scientists and Far East scientists, including the exchange of scientific and technical information; and to coordinate and support research efforts of interest to the Department of Defense through contracts and grants with Far East scientific institutions.

¹ These support costs do not include costs of office space, utilities, housing, and other base support which are provided under a status-of-forces agreement through the local command. No estimate of their true cost is available.

OFFICE OF NAVAL RESEARCH (LONDON)—LONDON, UNITED KINGDOM

Personnel strength, 65; support costs, \$605,000.²

Description of science mission:

(a) To assist the Chief of Naval Research in surveying the worldwide findings, trends, potentialities, and achievements in research and development by establishing and maintaining liaison between the U.S. Navy and all scientific research agencies and those development agencies conducting programs of naval interest.

(b) To represent the Assistant Secretary of the Navy (Research and Development), the Chief of Naval Operations, the Chief of Naval Material, and the Chief of Naval Research in all matters of general scientific and technical interest to the Navy.

(c) To assist the naval bureaus and offices in contracting for desirable research and development, and in patent matters.

(d) To provide general technical assistance as may be required to other U.S. Government scientific and technical agencies, and U.S. military commands and activities.

EUROPEAN OFFICE OF AEROSPACE RESEARCH—BRUSSELS, BELGIUM

Personnel strength, 59; support costs, \$668,438.

Description of science mission: Secures in free Europe, the Near East, and Africa, scientific research and development effort in support of the programs of Air Force organization; and provides scientific liaison which foster mutually beneficial relations among the United States, the European, the Near Eastern, and the African scientific communities.

ATOMIC ENERGY COMMISSION OVERSEAS SCIENCE OFFICES

To facilitate close and continuous liaison with foreign atomic energy programs and to assist in carrying out the AEC program of international cooperation in the peaceful uses of atomic energy, including the distribution of source, special, and byproduct nuclear materials and the exchange of technical information, AEC has established small overseas offices in London; Brussels; Paris; Tokyo; Chalk River, Ontario; and Buenos Aires, Argentina. A branch of the Chalk River office is located in Pinawa, Manitoba.

Generally, these offices are staffed with a senior representative having scientific and technical experience, to carry out the principal assignments, a technical staff assistant to lend support to the principal officer and to discharge the administrative functions of the office, together with the necessary secretarial assistance. A larger office, however, is attached to the U.S. Mission to the European Communities in Brussels to assist in carrying out the cooperative programs with the European Atomic Energy Community (Euratom) and to monitor the progress of the U.S.-Euratom joint research and development effort. Under the incentives provided by the U.S.-Euratom joint reactor program over 650 electrical megawatts of nuclear power capacity is in operation or under construction in the European community. This program is supplemented by a joint research and development effort to improve the efficiency of these and similar reactors. This joint effort was initiated in 1959 and has, through calendar year 1965, resulted in our support of \$21.6 million worth of research in the United States while the Euratom community has authorized \$29.2 million for research in its member countries. An arrangement concluded with Euratom in 1964 further provided for cooperation in the development of fast breeder reactors. These are but 2 of the more than 40 major information and materials exchanges, which in some cases involve long-term assignments of U.S. technical specialists with other nations and multinational groups.

Currently the authorized strength of all our foreign offices totals 24 persons of whom 8 are assigned to the Brussels office. In addition, arrangements have been made with the Department of State under which AEC's foreign offices obtain the services in the aggregate of five or six State employees each year

² Does not include costs of military pay and allowances. Estimated cost is \$160,000.

on reimbursable detail, and about five "when actually employed" employees on a reimbursable basis.

The attached listing of the AEC foreign offices shows the number of employees assigned to each office as well as estimated costs for fiscal year 1966.

It will be noted that the costs of operating these offices during fiscal year 1966 will total approximately \$708,000. Also attached is a listing of our foreign offices showing the jurisdictional territory of each office.

The AEC had distributed through sale, lease, and deferred payment sales, special nuclear and other materials abroad to the approximate total value of \$141.7 million, resulting in dollar revenues to the United States of \$84.6 million through fiscal year 1965. It is estimated that the value of materials distributed abroad in future years will increase substantially and by 1980 will reach into the billions of dollars. U.S. industry has sold 13 nuclear power reactors and over 50 research reactors to foreign countries through calendar year 1965. AEC's foreign offices are considered to be of major importance in maintaining the United States strong competitive position in the foreign nuclear power market. Thus, these offices, representing a relatively small investment, are contributing importantly to an enterprise that is already having a favorable effect on the U.S. balance of payments and will become of substantially more significance in this regard as the nuclear power industry continues to expand.

It should be noted that AEC's foreign offices are not routinely involved in the administration of AEC's foreign research contracts.

AEC foreign offices, estimated costs, 1965

Office	Regular AEC positions	Total
Brussels.....	8	\$245,000
Buenos Aires.....	2	70,000
Chalk River.....	3	75,000
London.....	3	74,000
Paris.....	3	98,000
Tokyo.....	3	90,000
Total.....	22	652,000

AREAS OF JURISDICTION OR PROGRAM INTEREST

Brussels office (Brussels, Belgium: Euratom, France (excluding national program), Belgium, Italy, Luxembourg, the Netherlands, and West Germany.

Buenos Aires office (Buenos Aires, Argentina): All countries of South America. (Does not include Central America.)

Chalk River office (Chalk River, Ontario, Canada) and the Whitesell Branch (Pinawa, Manitoba): Canada.

London office (London, England): Ireland and the United Kingdom.

Paris office (Paris, France): Austria, Denmark, Finland, France (except on Euratom matters), Greece, Iran, Iraq, Israel, Lebanon, Norway, Portugal, Spain, Sweden, Switzerland, Turkey and Yugoslavia.

Tokyo office: Republic of China (Taiwan), Indonesia, Japan, South Korea, Philippines, South Vietnam, and Thailand.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION OVERSEAS SCIENCE OFFICE

Staff: NASA European Representative, Secretary.

Address: American Embassy, room M-12, Paris, France.

Functions: The NASA European Representative is responsible for the following functions:

1. Facilitate implementation of NASA's agreed cooperative programs in Europe;
2. Maintain contact with and report on European space science and technology for the benefit of NASA, the Department of State and other interested U.S. agencies;

3. Service specific information needs of NASA offices ; and

4. Serve as a preliminary point of contact for interested European agencies, universities, and industries seeking program or policy information about NASA of a broad character.

Established: October 1965.

Costs for fiscal year 1965: Direct costs (salaries, allowances, travel, representation, initial office equipment), \$35,000; Embassy administrative support, \$3,533; total, \$38,533.

Mr. REUSS. Thank you all for your fine cooperation in helping us this morning, helping us both in science and balance of payments.

(Whereupon, at 12:05 p.m., the hearing in the above-entitled matter was adjourned, to reconvene at the call of the Chair.)

FEDERAL FOREIGN RESEARCH SPENDING AND THE DOLLAR DRAIN

THURSDAY, FEBRUARY 24, 1966

HOUSE OF REPRESENTATIVES,
RESEARCH AND TECHNICAL PROGRAMS SUBCOMMITTEE
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
Washington, D.C.

The subcommittee met at 10:05 a.m., in room 2154, Rayburn House Office Building, Hon. Henry S. Reuss (chairman of the subcommittee) presiding.

Present: Representatives Reuss, St Germain, Dickinson, and Brown. Also present: Mrs. Edna Gass, staff administrator; and John H. Betz, Counsel.

Mr. REUSS. Good morning.

The session of the Research and Technical Programs Subcommittee of the House Committee on Government Operations will be in order for a continuation of our hearings into the question of foreign research spending and its impact upon our balance of payments.

As I have said before, the subcommittee and the Congress in general believe deeply in the research programs which have been authorized over the years by the Congress, and we also recognize the international character of science and the desirability of international cooperation. At the same time, we are concerned, as Congress must be, with our balance of payments. While progress was made last year in reducing the annual balance-of-payments deficit, which had been going on at the level of around \$3 billion a year to \$1.3 billion for 1965, we are nevertheless concerned that continued progress be made and are aware of the Secretary of the Treasury's determination that the balance-of-payments deficit be wiped out this year.

The reduction in our balance-of-payments deficit has been made largely by doing a number of things which in a perfect world and with a payments situation in balance we would not have wanted to do.

We have tied our foreign aid, for example, to purchases in this country which has the effect of making foreign aid less effective than it would be on a buy-it-anywhere basis. We have imposed severe clogs on the free movement of capital between this country and abroad. We have restricted American banks and American businesses in their lending and investment policies abroad.

We have put restrictions on Federal procurement policies for goods purchased abroad, requiring, in general, that they be purchased in the United States, unless the cost of purchasing in the United States would exceed foreign costs by more than 50 percent.

The subcommittee notes that during the period when our balance-of-payments situation became critical, foreign research expenditures requiring dollar payments actually rose from \$23.7 million in fiscal year 1962 to \$28.5 million in the current fiscal year.

While the total amount of foreign research requiring dollar expenditures is not large—it hovers in the neighborhood of \$30 million a year—nevertheless, the further reduction of our balance-of-payments deficit, I think all would agree, requires attention to some of the smaller items. We have already taken most of the major steps which can yield large balance-of-payments economies.

Accordingly, we have asked to be present here this morning representatives of the Secretary of the Treasury, in this capacity as Chairman of the President's Cabinet Committee on the Balance of Payments, and of the Bureau of the Budget, which is the agency charged with maintaining the so-called gold budget on Federal dollar expenditures abroad. And we have asked the Director of the Office of Science and Technology, the Office which is responsible for overall surveillance of the science research programs, to join us.

We welcome here this morning Assistant Secretary of the Treasury Merlyn Trued, Assistant Director of the Bureau of the Budget Charles Zwick, and Director of the Office of Science and Technology, Dr. Donald Hornig.

Each of you three gentlemen has filed a comprehensive statement and, without objection, they will be admitted into the record.

Will each of you proceed to summarize your statement, or make any other statements you care to. I think we will go from the general to the particular and first call upon Mr. Trued of the Treasury, then Mr. Zwick of the Budget Bureau, and then Dr. Hornig.

Mr. Trued.

STATEMENT OF MERLYN N. TRUED, ASSISTANT SECRETARY FOR INTERNATIONAL AFFAIRS, DEPARTMENT OF THE TREASURY

Mr. TRUED. Thank you very much, Mr. Chairman, members of the committee.

(The prepared statement of Mr. Trued is as follows:)

PREPARED STATEMENT OF MERLYN N. TRUED, ASSISTANT SECRETARY FOR INTERNATIONAL AFFAIRS, DEPARTMENT OF THE TREASURY

I appreciate the opportunity to appear today before this committee, the chairman of which has already demonstrated over time a deep interest in, and concern for, our balance-of-payments position. Your continued interest, and the interest of the committee as a whole, is gratifying indeed.

I would like to review with you where we have been, where we are today, where we are heading, and the administrative techniques we are using to help us reach our balance-of-payments goals.

As you know, we have had deficits in our balance of payments in every year but one since 1950. During the 7 years 1958-64 the deficit averaged \$3 billion a year on an overall or "liquidity" basis. In 1965, we succeeded in reducing the deficit to \$1.3 billion, less than half the figure of the year before. Only last week—on February 15—Secretary of the Treasury Fowler reaffirmed that, despite uncertainties arising from the conflict in Vietnam, our goal remains equilibrium in our foreign payments accounts this year. As I am sure you know, equilibrium has been defined as \$250 million on either side of balance (again computed on an overall basis). Our deficit last year on the other principal accounting basis, the official settlements account, was \$1.4 billion, not greatly different from the deficit on the overall account.

The improvement that we have made to date and the gains that we hope to make in 1966 depend on a continuing effort, on a broad front, and on the part of many individuals and groups inside and outside the Government. The present 1966 balance-of-payments program was set forth by President Johnson last December.

The balance-of-payments program is formulated, in considerable measure, and is coordinated and reviewed by, the President's Cabinet Committee on Balance of Payments, established by President Kennedy in 1962. Its membership includes the—

- Secretary of the Treasury, as Chairman.
- Secretary of Defense.
- Secretary of Commerce.
- Under Secretary of State.
- Under Secretary of Agriculture.
- Administrator of AID.
- Director of the Bureau of the Budget.
- Chairman of Council of Economic Advisers.
- Special Representative of Trade Negotiations.
- Special Assistant to the President for National Security Affairs.

The Chairman of the Federal Reserve Board is also regularly invited to attend meetings of the Cabinet Committee on Balance of Payments, and has attended them.

Much of our success in reducing the deficit last year is attributable to the private sector's success, under our voluntary programs, in reducing capital outflows. While direct investment increased for the year as a whole, the rate of spending dropped in the second half, and there were dramatic improvements in outflows of bank credit and other types of capital. As a result, private capital outflows as a whole dropped from \$6.5 billion in 1964 to about \$3.5 billion in 1965.

However, let me emphasize that the reduction of the balance-of-payments costs of Government programs is a major—and highly successful—part of the balance-of-payments program. Indeed, efforts on this front go back as far as 1960, thus antedating by some years calls for the private sector to exercise restraint on its dollar outflows. As a result, between 1960 and 1965, the combined dollar cost of military and foreign aid programs dropped by \$1.4 billion, from \$3.8 to \$2.4 billion. The gain in 1965 would have been significantly higher had it not been for the increased tempo of the Vietnam conflict in the second half of the year.

The implications of this latter development for Government expenditures abroad was brought across forcefully in the balance-of-payments program for 1966, made public on December 6, 1965.

I should like to quote one paragraph—point 6—from the "Summary of Recommendations by the Cabinet Committee on the Balance of Payments" released that day:

"The current efforts by all Government agencies to reduce to a minimum the balance-of-payments impact of their operations be intensified. The importance of vigorous effort in this area is all the more important in the light of unavoidable increases in the balance-of-payments costs of economic aid and military operations in Vietnam."

In those same recommendations, banks and businesses were called upon further to restrain the balance-of-payments outflows resulting from their operations.

With respect to Vietnam, Secretary Fowler said on February 15, in announcing balance-of-payments results for 1965 and discussing the outlook for 1966:

"Of course the two main imponderables are the rising balance-of-payments costs in southeast Asia in both the military and the aid programs which are the result of Vietnam, and the direct and indirect impact of Vietnam on the domestic economy and the balance of trade.

"With this in mind, we must, certainly, make every effort—we must not fail in our continuing efforts, both in and out of Government—to find and to make every reasonable and practical offset to the impact of Vietnam on our balance of payments."

This involves the process of critical review which recognizes that highest priority needs alone are enough to strain our payments position. What we spend in one area for a certain purpose simply is not available for another purpose.

A key instrument in carrying out policy is the gold-budget procedure, which is the responsibility of the Bureau of the Budget. Mr. Zwick is here to describe the procedure and how it works. I would simply note that the gold-budget procedure is now under review at the request of the Cabinet Committee on Balance of Payments.

It would not be within my competence to comment on specific parts of the items that go into the gold budget. As regards the research and technical programs involving dollar outflows from the United States that is before this Committee, decisions as to their level and essentiality must be judged by others who bear the immediate responsibility for this program. What we do seek to insure is that that balance-of-payments costs are taken fully into account when the desirability of the expenditures in question are appraised. The efforts of the Cabinet Committee are designed to do just that.

Mr. Chairman, the hearings now underway should help very substantially to center attention on the task before us on the balance-of-payments front. We appreciate your efforts to that end.

Mr. TRUED. I would like to highlight very briefly key points of the statement which you have received for the record. I think the chairman of the committee has already set forth in very good fashion the substance of our balance-of-payments problem and the comprehensive measures which we have taken, unwelcome as they may be to many of us, as temporary means of buttressing our payments position and stopping our gold losses.

As you know, Mr. Chairman, the Government spending abroad sector of our balance of payments received early attention dating back to the administration of President Eisenhower where the first attempts were made to cut down on this item. Since that time, Mr. Chairman, the program has been expanded and reinforced and subsequently we have had to ask the private sector to share with us the burden of bringing the necessary improvement in our payments position.

Very simply, we still have a very serious balance-of-payments problem. The results last year were gratifying. There was certainly no reason for complacency. The fact is that we must eliminate the spending of every dollar abroad that cannot be justified on the basis of compelling need.

The situation is that a dollar spent abroad for one particular purpose cannot be spent abroad for another purpose. Even the highest priority items alone bring strain to the balance-of-payments position and as much as we must shoulder these particular burdens must not be compromised by those programs or efforts abroad which can either be delayed or set aside.

The Cabinet Committee on Balance of Payments, the membership of which is in my statement, so I will not review that, is concerned with the broad implications of policy, the broad stating of policy and recommendations to the President for the development of a program that will bring us overall into a sustainable balance-of-payments position. It does not get into the intricate details of particular programs or projects. It does seek to assure that the balance-of-payments consideration is fully taken into account by every agency of Government when they, as their responsibility, are developing the programs that they must carry out.

Therefore, I just want to emphasize once more, Mr. Chairman, that we are not at the end of the road in solving the balance-of-payments problem. The costs of Vietnam are going to be very high on the balance-of-payment front. We have to compensate for them as best

we can and every effort should be made to do that through other programs, other aspects, expenditures elsewhere in the world.

The key control mechanism which the administration uses in carrying out this trimming of potential expenditures is the gold budget review which is the responsibility of the Bureau of the Budget, and I would leave consideration of that and the aspects of it to my colleagues here at the table.

I would simply say that at this point, the gold budget review procedure is under intensive review at this moment at the request of the Cabinet Committee on Balance of Payments and the results of that review should be forthcoming shortly. If in any particular it does not serve or serves inadequately to emphasize the need for the most careful scrutiny and evaluation of expenditures, those corrections will be forthcoming.

But we believe up to this point it has served a very useful, critical purpose, that on the broad front it has worked well and successfully and we hope in its modified form as may be appropriate it will continue to serve a very critical purpose on a critical front.

Thank you, Mr. Chairman.

Mr. REUSS. Thank you, Secretary Trued.

Mr. Zwick.

STATEMENT OF CHARLES J. ZWICK, ASSISTANT DIRECTOR, BUREAU OF THE BUDGET

Mr. ZWICK. Thank you, Mr. Chairman.

(The prepared statement of Mr. Zwick and the reponse of the Bureau of the Budget to questions of the subcommittee are as follows:)

PREPARED STATEMENT OF CHARLES J. ZWICK, ASSISTANT DIRECTOR OF THE BUREAU OF THE BUDGET

Mr. Chairman and members of the subcommittee, it is a pleasure to meet with this subcommittee to explain the measures by which we seek to balance the need for financing overseas research and development against the necessity to minimize dollar expenditures abroad.

Our efforts to reduce the balance-of-payments impact of the activities of the Federal Government are not, of course, confined to the area of research and development. I believe it will be helpful to review first the overall "gold budget" policies and procedures of the executive branch, and then to take up the subcommittee's specific questions on research and development.

The U.S. balance-of-payments position has been a matter of great concern to the executive branch for a number of years. As one part of the Government's overall effort to overcome the payments deficit, the President has directed that every department and agency head make it his personal responsibility to insure that Federal programs conducted abroad are necessary and that every feasible measure is taken to improve the balance-of-payments effects of such programs. These efforts have resulted in a significant reduction in dollar expenditures abroad. Between fiscal years 1963 and 1965, a reduction of about \$715 million has been achieved in net dollar payments abroad due to Federal Government activities.

However, the United States has major responsibilities and commitments in many parts of the world, and our objective cannot be the reduction or elimination, at all costs, of activities which have an adverse impact on the balance of payments. Rather, we must seek to insure that our activities abroad will best serve to advance the security and welfare of this country. Thus, although we expect a further reduction between 1965 and 1967 in the net outflow resulting from regular Federal programs, the costs of special Vietnam operations will cause an increase in the net amount of Federal payments abroad during that period.

In order to carry out the President's balance-of-payments objectives, the Bureau of the Budget has established policies and criteria for agency actions and a system for reviewing agency performance and future plans. Current instructions to the agencies on this subject are contained in Bureau of the Budget Circular No. A-58, dated July 7, 1964, which contains the following section on policies:

"3. *Policies on payments and receipts.*—The head of each agency will be responsible for taking all possible steps for his agency to minimize payments and maximize receipts entering into the balance of payments, in accordance with the following policies:

(a) Each agency will review its requirements for conducting activities abroad, with a view to terminating these activities, consolidating them, or restricting their scope, wherever this can be done without damage to the national interest, even though it may result in additional budgetary costs.

(b) Each agency will review those activities in which there is cost sharing by other countries, with a view to negotiating the assumption by other countries of a larger share of common and joint costs wherever this can be done without damage to the national interest.

(c) With respect to procurement of equipment, materials, and supplies abroad, agencies will follow announced policies or such special instructions as may have been issued for each agency.

(d) Each agency will establish administrative policies and controls as necessary to keep payments abroad to a minimum. Such policies and controls should be applied to the use of funds made available through contracts, grants, and fellowships, as well as to direct expenditures. Particular attention should be given to limiting overseas travel to the minimum necessary to accomplish the agency's program.

(e) Every effort should be made to maximize, as a substitute for dollars, the use of foreign currencies which the Treasury Department has determined to be excess, in incurring obligations and making payments for contracts, services, wages, pensions and other benefits, and procurement. Necessary activities overseas should be located in excess-currency countries (in preference to other countries) to the maximum extent possible.

In addition, the head of the agency will recommend such steps as he deems appropriate which are beyond his responsibility to effectuate."

The circular also requires that each agency head establish a management and control system so that all aspects of this area of management are clearly defined and well understood within his agency. The circular requires statistical reports to the Bureau of the Budget twice a year analyzing past transactions affecting the balance of payments and projecting those for the future. Two additional shorter reports updating the more comprehensive statistical ones are also required. It is made clear that the estimates are not intended merely to be forecasts of what will happen if present practices continue. Instead, they are to be plans of what the agency head will attempt to bring about, by changing present practices in accordance with Government policy where necessary. The reports are reviewed by the Bureau of the Budget, and the agencies' projections, with any revisions which may be suggested by the Bureau, become targets for minimizing expenditures and maximizing receipts.

Whenever payments exceed the target for the year, or receipts are less than the target, the reason for the failure to achieve the target must be explained by the agency. In special circumstances an agency head may be required to provide a report for consideration by the President.

This has been a very brief summary of our "gold budget" policies and procedures. The operation of this system is under continuing scrutiny by the Bureau of the Budget and the Cabinet Committee on Balance of Payments. I believe that the system provides an effective management tool through which the President's directives are being carried out.

Your subcommittee has expressed its concern about the balance-of-payments impact of Federal Government support for research conducted abroad. Very early in the operation of the "gold budget" process, the Bureau of the Budget identified this as an area in which a special effort would be useful. In discussions with the agencies principally concerned, agreement was reached on general criteria intended to insure that research supported abroad is essential to the accomplishment of an agency mission and cannot be done effectively without dollar expenditures overseas. Agencies are expected to limit support of foreign investigators to work involving specialized competence or unique geographical

interest; for example, the study of astronomical bodies visible only from the Southern Hemisphere, the investigation of physical or biological phenomena which do not occur within the United States, or work in which a foreign scientist has developed ability in a specific field substantially superior to that which is available in the United States.

Because of the "gold budget" limitations and the requirements for support of research in the United States, agencies are expected to support basic research proposals from foreign scientists only when such proposals rank higher in quality than the average of the proposals for which U.S. scientists are given support.

In supporting research by foreign scientists, agencies are instructed to take every feasible step to minimize the balance-of-payments impact of such support. These steps include, for example, efforts to obtain the greatest possible amount of indigenous support for the project, use of excess foreign currencies where available, the purchase of equipment from U.S. sources, and limitations on the payment of indirect costs of the research.

These general criteria and operating principles for the support of research outside the United States have been incorporated in the Federal Council for Science and Technology document "Policy Guidance for Research Investment Abroad by U.S. Agencies." I understand that Dr. Hornig will discuss this document in some detail in his statement to the subcommittee. Starting in 1963, certain specific ceilings have been in effect for the Public Health Service, including the National Institutes of Health and the National Science Foundation. In fiscal year 1966 a ceiling of \$9.5 million has been set for all PHS research grants which affect the balance of payments, and a \$750,000 ceiling has been established for NSF grants in developed countries. In 1963, the Department of Defense agreed that by 1966 it would reduce annual obligations for research in Western Europe, Australia, and New Zealand to 50 percent of the 1963 level. This target was later extended to cover exploratory development, as well as research, in these countries.

The detailed response to the subcommittee's questions, attached to this statement, explains why categorical limitations have not been imposed on other scientific activities abroad. However, these activities are subjected to careful scrutiny and control within the overall "gold budget" procedure, through devices other than specific ceilings. For example, almost all of the foreign expenditures of the National Aeronautics and Space Administration result from the construction and operation of satellite tracking stations around the world. The number and location of such stations and the levels of operating support they require are carefully evaluated in relation to the goals and specific flight missions of the space program. NASA's support of research and foreign scientists (excluding tracking station operations) is relatively very small, currently about \$200,000 annually and is limited to essential research directly related to the NASA functions which cannot be done effectively in the United States.

A somewhat similar situation exists with regard to the Atomic Energy Commission. A substantial portion of the Commission's overseas research expenditures each year are for support of the Atomic Bomb Casualty Commission in Japan. The Budget Bureau has revised this activity very carefully, and we believe that the expenditures are being held to a minimum consistent with the national interest in this important field. In 1965, the AEC initiated a heavy water organic cooled reactor research program, using an existing Canadian reactor. Although this will require dollar expenditure affecting the balance of payments, the alternative would have been to construct the necessary facilities within the United States at a much greater total cost.

No specific reduction target has been set by the Bureau of the Budget for overseas activities of the Department of Defense in the area of weapons systems development, services, and testing. Work in this category, although included in published statistics on research and development, is of a significantly different character from research and exploratory development, for which specific reduction targets were set. Systems development and related activities include the development of weapons and other equipment for the use of the United States and allied military forces. The interests of this country would not be served by adopting policies which would seriously weaken the capabilities of our allies to produce necessary war materiel. Where necessary, therefore, the Department of Defense has undertaken development efforts with allied governments. Defense has undertaken to minimize the balance-of-payments impact of such activities by limiting them to items of importance to Defense such as the V/STOL (vertical and short takeoff and landing) aircraft. The dollar expenditures for

systems development activities are offset in part by foreign government purchases of military equipment from the United States.

In addition to the specific ceiling established for National Science Foundation research projects grants to Western Europe, Canada, Australia, and New Zealand, the Foundation was asked to take a number of other actions to reduce its expenditures abroad. Predoctoral fellowships for U.S. citizens to study abroad have been limited to exceptional cases in which it is clear that equivalent training cannot be obtained in the United States. Travel by NSF-supported fellows is restricted, where reasonable, to American-flag carriers, and the Foundation has abolished offices which it formerly maintained in Paris, France, and Rio de Janeiro, Brazil.

One of the difficulties in a discussion of Federal Government research and development activities abroad is that the published statistics have not been set up to answer some questions that have emerged as significant. In the National Science Foundation report, "Federal Funds for Research, Development, and Other Scientific Activities," the amounts reported include, in some cases, payments with excess foreign currencies and amounts for the purchase of equipment from the United States. While this accurately reflects total activity by foreign performers, it does not measure the balance-of-payments impact of the activity.

This is illustrated by the table supplied to the subcommittee. The amounts shown in the first part of the table as "Total obligations" are on the reporting basis used by the National Science Foundation. Shown below that are the amounts for excess foreign currency and purchases of equipment from the United States. Deducting these amounts gives an estimate of net obligations affecting the balance of payments, as shown in the last part of the table. Half or more of these net obligations are for Defense Department development and testing of military equipment and systems, the operation of NASA tracking stations, and the AEC heavy-water reactor program in Canada. The dollar obligations for all other Federal research and development programs abroad are substantially level.

The subcommittee asked in its letter if the "gold budget" ceilings were intended to limit dollar spending to nonpostponable, urgent projects. I do not believe one can approach in quite these terms the problems that this subcommittee and we in the Bureau of the Budget are trying to deal with. Our real purpose is to see to it that the balance-of-payments effects of Federal research and development programs are held to the minimum consistent with the achievement of the overall objectives of the Federal Government. In this, I believe, we are succeeding. Any research project might be thought postponable since we cannot know its results beforehand and cannot, therefore, be assured that the results will be of immediate or future value. The Bureau of the Budget is of the opinion that the controls which exist, both the overall targets for all dollar expenditures and the specific limitations on research and development, do provide an adequate basis for assuring that Federal agencies will expand dollars abroad only on projects of high quality and relevance to their mission objectives.

Like many others, I have sometimes found it difficult to imagine the purpose or worth of a particular research project by reading its title. Usually, however, mission relevance as well as a reasoned scientific basis can be shown for supporting the project in question. The funds available to support research projects—and particularly research projects abroad—are very limited in comparison to the research objectives of the Federal agencies and the large volume of proposed projects competing for support. In these circumstances, scientific panels and Federal agency program administrators must allocate carefully limited funds available for overseas research.

In conclusion, let me reemphasize that the Bureau of the Budget shares the concern of this subcommittee that the overseas research programs of Federal agencies shall be planned with appropriate consideration of the balance-of-payments problem. We will continue to scrutinize these programs closely, both in the regular budget reviews and in the semiannual "gold budget" process, and we will continue to seek ways to make our policies and procedures more effective. Any recommendations by this subcommittee will, of course, receive our most careful consideration.

STATEMENT IN RESPONSE TO QUESTIONS RAISED BY SUBCOMMITTEE LETTER DATED
FEBRUARY 11, 1966

1. Determination of ceilings

(a) How are the present "gold budget" ceilings on foreign research grants determined?

Ceilings on foreign research grant obligations of the Public Health Service and the National Science Foundation are established on the basis of Bureau of the Budget review of the agency plans for foreign activities, submitted in accordance with Circular A-58, and of regular budgetary reviews of overall agency research programs. Bureau of the Budget staff members consult with agency representatives concerning the minimum levels of overseas research support needed to meet their mission needs, progress in encouraging indigenous sources of support, the use of excess foreign currencies, and other measures to minimize dollar expenditures resulting from research support. In the case of the Department of Defense, the "gold budget" reviews consider Defense Department progress toward the 50-percent reduction between 1963 and 1966 in research support in developed countries, a target established by agreement in 1963 between the Defense Department and the Bureau of the Budget.

(b) Are the ceilings intended to limit dollar support to urgent nonpostponable projects which cannot be carried out in the United States?

The ceilings are intended to limit dollar support to projects which have a high degree of relevance to the missions of the supporting agencies.

(c) Has the Bureau of the Budget made samplings of research projects presently supported by the departments and agencies operating under ceilings to determine whether these projects are of sufficient importance to justify the dollar drain which they cause, and thus to determine whether the ceilings are at a low enough level?

The Bureau of the Budget does not regularly review individual research projects supported abroad. The agencies' "gold budget" reports or budget hearings indicate mission relevance and other justifications for support of research abroad in terms of the subject matter and general purposes of research programs, geographical areas involved, and other pertinent considerations. Some large-scale projects are identified for individual consideration: for example, National Science Foundation support for a radio astronomy facility in Australia. It is the Bureau of the Budget's view that, except when major policy issues are involved, decisions on the merit of individual projects can only be made effectively by agency officials. The Bureau seeks to insure that agencies have reasonable criteria and efficient project review systems governing the consideration and approval of research projects.

2. *Comparison of ceilings*

(a) Why are the ceilings limited to the Department of Health, Education, and Welfare, National Science Foundation, and the Department of Defense? Should they not also be placed on all agencies of the Federal Government, either separately or on a global basis?

Under procedure established by Bureau of the Budget Circular A-58, the total overseas expenditures—including research—of each Federal agency with significant programs abroad are subject to an overall target approved by the Bureau of the Budget for each year and reviewed semiannually. Within these targets, specific limitations were established for PHS research grants and DOD research and exploratory development grants and contracts because of the relatively large dollar totals involved and the judgment, with which the Office of Science and Technology agreed, that specific limitations on research support, particularly in developed countries, would be helpful in stimulating greater indigenous support for research of interest both to the United States and to the country in which the work was done. In the case of the National Science Foundation, while the dollar total of foreign research grants is substantially lower than in the PHS and DOD programs, the other considerations are equally applicable.

(b) Why are they limited to grants and not applicable to other international science activities such as research contracts and fellowships awarded for study abroad? Should they not be extended to cover this more general category of foreign activities?

As indicated in the response to questions 2(a), specific ceilings were established for certain overseas research programs—which could have been controlled through the overall Bureau limitations on balance-of-payments transactions—because of the desirability of encouraging indigenous support for research, particularly in the developed countries. Much of the work not under the ceilings is directly and specifically related to the operational requirements of agency programs. The overseas components of such activities are reviewed by the agencies and by the Bureau of the Budget within the context of the total programs of which they are a part. Examples of activities of this kind include the worldwide

satellite tracking operations of NASA, Defense Department participation in projects with our allies for the development of military systems and equipment items, AEC use of a Canadian heavy water-cooled reactor for research which could not otherwise be done without duplicating this expensive facility in the United States, and PHS contracts for applied research or instrument development integral to research being conducted in the United States, when the required services are not available, or are available in insufficient quantity, in this country.

The agencies have established criteria designed to limit fellowships for oversea study to exceptional cases in which it is clear that equivalent training cannot be obtained in the United States.

(c) Why are the Department of Defense and the National Science Foundation ceilings limited to grants to developed countries, while the National Institutes of Health ceiling applies to all grants?

Specific ceilings on DOD and NSF support of research in developed countries were adopted for the reasons indicated in answer to question 2(a). The ceiling for PHS was extended to cover all foreign research grants primarily because of the relatively large size of the program. Operational problems of the Department of Defense—especially in the field of medicine—require research in underdeveloped countries where U.S. forces are or may be stationed. Since the work is necessary and there is little or no present possibility of indigenous support a firm limitation was not imposed on research in underdeveloped countries. The National Science Foundation supports comparatively little research in underdeveloped countries. Projects supported in such countries are related to phenomena of substantial interest to U.S. science, which can only be studied in the foreign region; for example, biological studies of tropical plant and animal life.

3. Departments and agencies—reporting

(a) Does the Bureau of the Budget regularly receive separate reports of obligations or expenditures on foreign research programs, covering grants and contracts to foreign institutions or scientists as well as fellowship spending abroad, from each department and agency?

The reports required by Bureau of the Budget Circular A-58 identify agency dollar expenditures abroad for all grant programs, including fellowships. Expenditures for research contracts are included in expenditures reported for other foreign procurement activities of the reporting agency. Additional information on research grant programs is obtained in budget hearings with agency representatives.

(b) Have the departments and agencies supplied the Bureau of the Budget with information on the amounts of research grants and contracts to U.S. institutions which are spent abroad and result in dollar outflow? If so, please supply the subcommittee with these figures.

The departments and agencies have not been asked to supply the Bureau of the Budget with information on the amounts of research grants and contracts to U.S. institutions which are spent abroad. As a practical matter, this information would be very difficult for the agencies to obtain with precision. It is the Bureau's view that if the research meets the agency's standards of mission relevance and high quality in competition with other research proposals, it would be undesirable to deny support because some of the work must be done outside this country. The agencies are expected to minimize the balance-of-payments impact of research by U.S. institutions by requiring travel on American carriers whenever possible and by limiting the purchase of equipment from sources outside the United States.

4. Science offices abroad

Are actions being taken to combine science offices of the departments and agencies in Europe and Asia into regional offices, similar to the South American regional science office in Brazil?

Federal agencies maintain representation abroad to obtain scientific information, maintain liaison with foreign scientists, and administer research and development activities abroad. The requirements to monitor effectively this research are such that the representatives, generally, must be specialists in particular fields of science. For example, AEC representation in Europe relates to Euratom and "Atoms for Peace" activities, Agriculture representatives in Paris and Amsterdam are concerned with research activities oriented toward the control of plant and animal diseases of concern to the United States, and Defense Department representatives are concerned with the military implications of research and development activities in foreign countries. Generally,

therefore, consolidation would not eliminate the requirement for the scientific and professional staff members now performing the work.

The Bureau of the Budget has requested agencies to terminate or consolidate representation abroad wherever possible. In 1964 as a result of discussions with the Bureau of the Budget, the National Science Foundation closed its offices in Paris, France, and Rio de Janeiro, Brazil. Recently the Defense Department directed the consolidation of offices now operated by the Army in Frankfurt, the Air Force in Brussels, and the Navy in London. We will continue to explore this question with the various agencies.

5. The International Subcommittee of the Federal Council on Science and Technology

In addition to the preparation and issuance of the August 7, 1964, guidelines on U.S. official research investment abroad, has the International Subcommittee or its parent body aided the Bureau of the Budget in determining what measures should be taken to restrict dollar outflow caused by foreign research spending?

The International Committee has served as a forum for discussion and evaluation of the repercussions abroad of various measures to reduce U.S. expenditures for foreign scientific activities. As a result of these discussions agencies were advised, through the committee, to give full notification to foreign scientists of the intended reductions, and the reasons for them, so as to minimize the adverse impact and provide time for researchers to seek other support. It was also recommended that agencies honor existing commitments insofar as possible within the limitations. The International Committee also urged agencies to consult with the Treasury Department on a regular basis to determine where it would be possible to make payments to foreign researchers in local currencies excess or near excess to U.S. needs.

Through Bureau of the Budget staff members who sit as observers in the committee, the Bureau has been kept aware of the implications for U.S. policy arising from the limitations on oversea dollar expenditures for research and has taken these implications into account in establishing reasonable ceilings or restrictions. The Office of Science and Technology assists the Bureau of the Budget in reviewing the scientific components of agency budgets, including oversea research.

Conduct of research and development by foreign performers¹

[Obligations in millions of dollars]

	Actual 1964	Estimate 1965	Estimate 1966
Department of Defense.....	27.6	34.5	26.4
National Aeronautics and Space Administration.....	8.6	11.6	15.7
Atomic Energy Commission.....	3.9	4.1	6.0
Department of Health, Education, and Welfare.....	24.6	20.4	25.6
Department of Agriculture.....	7.7	8.9	10.3
National Science Foundation.....	.6	.7	.7
All other.....	2.0	1.6	1.6
Total obligations.....	75.0	82.0	86.3
Transactions not affecting balance of payments in total above:			
Department of Health, Education and Welfare.....	10.6	8.7	14.2
Department of Agriculture.....	4.8	6.7	7.7
Department of Defense.....	1.1	1.1	.6
Atomic Energy Commission.....		.1	.2
Subtotal, excess foreign currency.....	16.5	16.6	22.7
U.S. equipment purchases included in total above:			
Department of Health, Education and Welfare.....	2.5	1.4	1.1
Atomic Energy Commission.....	.6	1.0	.9
National Science Foundation.....	.1	.1	.1
Subtotal, U.S. equipment purchased.....	3.2	2.5	2.1
Net obligations affecting balance of payments:			
DOD—Systems and other equipment development.....	13.7	19.9	14.5
NASA—Tracking station operations.....	8.5	11.4	15.5
AEC—Heavy water-cooled reactor program.....		.1	1.8
All other research and development.....	33.1	31.5	29.7
Net total.....	55.3	62.9	61.5

¹ Constructed on a basis comparable to NSF's Federal funds for research, development, and other scientific activities.

Mr. ZWICK. Mr. Chairman, members of the subcommittee, I would like to summarize my prepared statement by making four points. The first point: since August of 1962, the Bureau of the Budget has issued explicit statements to agencies concerning overseas expenditures. The most recent of these instructions is Bureau Circular A-58 dated July 7, 1964. As Mr. Trued has already pointed out, we have currently underway an interagency task force reviewing these instructions. The results of that review will be incorporated as revisions to A-58.

The second point we would like to make is that we believe that the controls which exist, both the overall targets for dollar expenditures and the specific limitations on research and development, have provided an adequate basis for assuring Federal agencies will expend dollars abroad on high priority projects.

Now, it is, of course, true that most systems can be improved and the experience that we have obtained in applying the gold budget since 1962 should allow us to improve on it and it is in that spirit that we are addressing the current review of the gold budget procedures.

The third point: the Bureau's examiners maintain close contact with the individual agencies. The policy statements and letters that we have provided to this committee exist not only for the guidance of the agencies but also for the guidance of our examiners, and it is through the continuous contact by the examiners with the agencies and periodic budget reviews that the Bureau exercises its responsibilities.

Finally, it is our opinion that the agencies have diligently applied the relevant policy guidance in making grants for overseas research, but as with the system, the individual agency's performance can probably be improved.

It is my experience that when one is attempting to apply severe standards, periodic reminders are needed if we intend to maintain performance. To provide such a stimulus was indeed a second reason for conducting the current gold budget review.

In sum, then, may we emphasize that the Bureau shares the concern of the committee that the overseas research programs of the Federal agencies shall be planned with appropriate consideration for the balance of payments. We will continue to scrutinize these programs closely—through the regular daily activities of our examiners, through the regular budget reviews, and through the gold budget process. We will continue to seek ways to make our policies and procedures more effective. And any recommendations by the subcommittee will, of course, receive our most careful consideration.

Thank you very much.

Mr. REUSS. Thank you, Mr. Zwick.

Dr. Hornig.

STATEMENT OF DR. DONALD F. HORNIG, DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY, EXECUTIVE OFFICE OF THE PRESIDENT

Dr. HORNIG. Mr. Chairman, in the first place I would like to submit for the record a new page 7 to my testimony. It doesn't change it in substance but there are a couple of ambiguities which I would like to clear up.

Mr. REUSS. Without objection, the substitution of page 7 of Dr Hornig's written statement will be made.

(The prepared statement of Dr. Hornig is as follows:)

PREPARED STATEMENT OF DR. DONALD F. HORNIG, DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY, EXECUTIVE OFFICE OF THE PRESIDENT

Mr. Chairman, members of the subcommittee, I appreciate this opportunity to review with the subcommittee the major policies and actions affecting the expenditure of Federal research funds for the support of research and development outside the United States—and particularly dollar payments to foreign investigators.

I. BENEFITS TO THE UNITED STATES

Research and development are financed outside the United States to serve the interests of this country in a number of important ways. First, there is research of interest to this country which can be carried on only outside the United States. Aborigines with extraordinary capacity to adjust to extreme environmental conditions—a capacity which may be relevant to the effectiveness of our troops under extreme conditions of heat, cold and privation—are found only in Australia. We must have tracking stations around the world. Astronomical observations of stars and other bodies in the Southern Hemisphere can be made only in the Southern Hemisphere. There are geographical differences in the incidence of types of cancer, blood diseases and heart disease and mental illness that shed light on our domestic health problems. Health and medical records essential to study of a number of disease problems exist for much longer periods in many countries than in the United States.

Protection of the health of our citizens at home and abroad—civilians and troops—requires a substantial investment in research outside the United States—mostly in less developed countries. We must be continually on guard against the importation of diseases. We must be prepared to protect our troops against diseases endemic in combat or potential combat areas. Cholera, various forms of malaria and hemorrhagic fever are cases in point. Continuing research where the diseases occur naturally is a critically important part of this protection. The cost of an adequate foreign medical research program is miniscule compared with the potential costs of epidemics here or abroad.

We are committed to help developing nations. As the President reiterated in his statement of February 2, 1966, on international health and education, "We would be shortsighted to confine our vision to this Nation's shorelines. The same rewards we count at home will flow from sharing in a worldwide effort to rid mankind of the slavery of ignorance and the scourge of disease. We bear a special role in this liberating mission." The scientific and technological component of this effort is important, and will go forward as an integral part of the health and educational components.

This country is not self-sufficient in sciences. Special competence not found in the United States is found elsewhere, generally but not always in advanced countries. It is of direct concern and interest to this country to insure that these foci of unique competence flourish. Work done in such laboratories, led by individuals of unique competence sets standards for fields of science, whether they are located at home or abroad, which by their influence improve the performance and rate of advance of many other laboratories in the same general field. Moreover, we are well advised to insure that these laboratories are both able and willing to accept advanced students and senior investigators from this country. Otherwise, our development is handicapped. Molecular biology, genetics, embryology and germ-free life are examples of such advanced work in Western Europe.

A number of large defense efforts involve both research and development efforts outside the United States. Among others, joint efforts with England and Germany relating to short takeoff aircraft and advanced tank development are in progress.

Finally, the support of research provides as a byproduct a strong intellectual and cultural bridge to an important segment of society in other nations.

Poor countries often cannot afford research which we need. While the capacity of richer countries to pay is increasing, their priorities are not always our priorities, and their patterns of financing higher education and research are not always designed to permit the selection of specific areas and individuals for special support.

II. BALANCE AMONG OBJECTIVES

While the United States will continue to finance research, for the reasons noted above, in both less developed and advanced countries for the foreseeable future, a number of factors properly condition the level of these expenditures. Among them are these:

1. The special need to hold down expenditures outside the United States in the light of the balance-of-payments problem.
2. The excellence, relevance, and cost of research projects in other countries in competition with related research in the United States.
3. The capacity of other countries to finance research conducted by their own citizens.

The essential problem is to reconcile goals. On the one hand, it is important to secure the benefits of research. On the other hand, it is important to restrain expenditures in general, and expenditures which adversely affect the balance of payments on the other. No single factor, including balance-of-payments considerations, is overriding.

III. MECHANISMS FOR SECURING BALANCE AMONG OBJECTIVES—GOVERNMENTWIDE AND AGENCY STANDARDS

The proper balance among objectives is sought through two related means. The first is a set of Government-wide criteria which state the objectives and standards for support of research by the Federal agencies outside the United States, and the application of these criteria by operating departments and agencies. These criteria had their origin in a report by the International Science Panel of the President's Science Advisory Committee, which is submitted for the record.

The second means is the establishment of dollar limits on agency expenditures abroad. The two are complementary.

Taking first the criteria, there are two basic guides. The first is a Bureau of the Budget document (circular No. A-58, July 7, 1964) which states the criteria governing all Federal expenditures overseas, and requires each agency to establish a management control and reporting system. The reports provide the basis for targets to be met by agencies. Failures to reach the targets must be explained by the agency, and an agency head may be required to provide a report to the President. The significant point here is that all dollar expenditures overseas are controlled. Special areas are selected for special restrictions when this seems indicated. The fact that a category of expenditure—such as developmental work overseas, or some research contracts, or research training activities—is not subject to special restrictions does not exempt it from the general control. Areas of expenditure are selected for special restriction on the basis of such factors as the rate of growth, the "controllability" of the expenditure (some expenditures, for example, are legal obligations and cannot be reduced), the amount of money involved, the tightness of the link to current agency operations, and the countries in which the expenditure is concentrated.

The second basic guide is a document entitled "Policy Guidance for Research Investment Abroad by U.S. Agencies." This document was endorsed by the Federal Council for Science and Technology on August 18, 1964, and it is submitted for the record. This policy document represents a revision, tightening and formalization of earlier statements of principle. It is reviewed periodically to assess its adequacy. It was revised in December 1964, to take more directly into account the balance-of-payments problem.

The document, which relates to all expenditures and not only to research grants, states why support of research under specified conditions is in the interest of the United States, and it also states the criteria limiting expenditures.

In my judgment, this document provides adequate guides to those in the operating agencies who are held responsible for administration of research and development programs. The most important factor in setting standards of observance is the general quality of administration of grant and contract programs. In our judgment, the sense of responsibility, the sense of public accountability, the probity and the quality of judgments characterizing the administration of these programs is high. The agencies responsible for the largest overseas research expenditures have adopted specific supplemental administrative measures intended to limit research expenditures abroad, to stretch the dollars, and to insure that the investigations that are financed are above average quality and relevance. These are consistent with the general Federal guides.

IV. EXPENDITURE RESTRICTIONS

Administrative guides and principles are a necessary but not a sufficient means of establishing reasonable levels of investment in research and development abroad. Proper, effective, economical administration, including full observance of policy guides often results in a volume of properly supportable research which is larger than can be financed in the light of fiscal restraints. The administrative guides set, in effect, quality controls and help to insure that any given volume of expenditures is most effective. They inherently are not capable of fixing dollar limits. For this reason, specific dollar restrictions are imposed in addition to the administrative controls.

These limitations are described in the testimony of the Bureau of the Budget, and need not be reiterated here. They have represented and continue to represent the considered judgment of the administration as to the level of foreign research expenditures that are in the best interest of the United States, taking all factors into account.

As a matter of deliberate policy, research expenditures by the United States have been restrained since 1963. Before 1963, expenditures by this country for research in other countries had been rising in Europe and other advanced countries as well as in the less developed countries. Over those years, the assistance of this country had been an important factor in the reestablishment of the economies and research structures of Western Europe. By 1963, it had become evident that a new phase should be inaugurated because of the increasing capacity of the more prosperous nations to finance research. Accordingly, in 1963, restraints were imposed by the Bureau of the Budget, and the testimony of the Bureau presents details. The net effect of the restraints has been to hold research expenditures in relatively prosperous countries down, and to cut them quite sharply in the case of some agencies.

The restrictions placed on the agencies are a part of the budgetary process. If they have sound reasons to support research which they consider to be of high quality and directly relevant to their missions and if they handle funds prudently they may expend funds up to but not beyond what they are allowed. Cooperation by the agencies with the policies of the President consists of sound, prudent administration of funds within the administrative guides and the financial limits set for them. Under these conditions, expending the funds available to them does not constitute lack of cooperation by the agencies with the aims by the President.

The Bureau of the Budget, the Department of the Treasury, and the Office of Science and Technology are in agreement that the approach taken has made it possible to achieve a reasonable balance among the goals sought by this country.

V. EFFECTS OF LIMITATIONS AND INITIATIVE IN SUBMITTING APPLICATIONS

Research that is significant to the United States and which will not be financed without help from this country generally far exceeds sums available to the agencies. The task of the agencies is to select the foreign research of highest significance to their missions and of highest scientific quality. In this situation, the interests of the United States are best served if the choices are made with full knowledge of the interests and competence of foreign investigators. When these investigators and laboratories are known, Federal agencies sometime take the initiative in seeking them out and suggesting studies. This sometimes results in support of their work. Often foreign investigators apply for support upon their own initiative. No matter who takes the initiative, the same criteria of relevance and excellence are taken into account. Within a given agency, all applications from foreign sources are in competition with each other and with applications from U.S. citizens.

VI. ASSESSMENT OF INDIVIDUAL PROJECTS

The suggestion has been made that certain research projects might be postponed on the ground that the interests of the United States would not be harmed if prosecution of the investigations were postponed until the balance-of-payments situation improved.

This matter is dealt with through the combined operation of scientific and administrative judgments, and of fiscal limitations. The projects that have been postponed, or terminated, are the ones that would have been financed if the

criteria for awards and the fiscal limitations had not been imposed. Judgments as to which research cannot or should not be financed are left to the operating agencies. The questions of scientific significance are considered by scientists within and outside the Federal Government. Questions of relevance are decided by a combined scientific and administrative judgment. We are satisfied that these judgments are exercised intelligently and responsibly by trained people within and outside the Federal Government.

In this connection, the administrative standards and the specific dollar limitations are mutually reinforcing. The restrictions on expenditures tend to elevate the average quality of the financed research and to confine support to more highly relevant investigations because competition for funds is sharper.

VII. THE POSITION OF ADVANCED COUNTRIES

In considering why the United States should finance research in advanced countries, a number of relevant questions arise. Why do not these relatively prosperous countries finance this research themselves? Do they support research outside their own boundaries? Are their R. & D. expenditures rising as their economies expand? These questions are dealt with below.

(a) Research and development expenditures in advance countries

The expenditures of every advanced country on research and development have been rising rapidly. For most of these countries, the rate of growth has approximated the rate of growth in the United States. When military R. & D. expenditures are removed from the figure, several countries (Great Britain, Sweden, and Japan, for example) spend almost as high a proportion of their GNP on R. & D. as does the United States.¹ In some other advanced countries, such as Canada, Australia, and Norway, R. & D. expenditures are a smaller proportion of GNP. Poor countries spend a still smaller proportion of their GNP on R. & D.

The rate of increase in R. & D. expenditures of some of the relatively smaller, as well as the larger, countries is impressive. For example, the increase in Canadian research expenditures has been marked. In 1963-64, the expenditures of the Canadian National Research Council for support of academic science increased by 21 percent over the previous year to a level of \$12.6 million.² Their expenditures for industrial research assistance doubled from 1962-63 to \$2.4 million in 1963-64. The expenditures of the Canadian Medical Research Council increased by 20 percent to a level of \$5.1 million in 1963-64.

Total U.S. support for R. & D. in advanced countries (including heavy military development expenditures) is a very small proportion of the R. & D. funds expended by these countries. Precise figures are not available, but estimates can be made with an adequate degree of accuracy. R. & D. expenditures in Western Europe will approximate \$5.5 billion in 1966.³ In that year total U.S. R. & D. expenditures in Europe will approximate \$44 million, or somewhat more than one-half of 1 percent of the local investment. If the large U.S. military development expenditures in Western Europe are subtracted, the proportion of research and development conducted in Europe with U.S. funds would be substantially less than one-half of 1 percent.

On grounds of simple ability to pay, there is no doubt but that relatively prosperous countries taken as a whole could provide additional funds equal to the amount of the U.S. investment in R. & D. However, it does not follow from this fact that other countries would finance the specific research considered to be of high priority by the United States. This is true for a number of reasons. Most important is the fact that their priorities and ours often do not fit. For example, we wanted to see a sharp acceleration in the excellent research in embryology in Europe after the establishment of the U.S. National Institute for Child Health and Human Development and after the thalidomide incident. We had no research of comparable excellence on the development of the human

¹ "Basic Research and National Goals," a report prepared by the National Academy of Sciences for the Committee on Science and Astronautics of the House of Representatives.

² National Research Council of Canada, 47th annual report.

³ Freeman, G., and Young, A., "The Research and Development Efforts in Western Europe, North America, and the Soviet Union." OECD, Paris, 1965, p. 71. Expenditures for Belgium, France, Germany, Netherlands, and United Kingdom were \$4.360 billion in 1962. Estimated as \$5 billion for all of Western Europe. Assumed 5 percent compound growth rate produces \$5.480 billion in 1966.

fetus, and the funds for acceleration of the work were not available to the European laboratories.

The structures of most European nations for allocating funds to science and technology are changing in a way that permits them to set priorities more precisely. In earlier years, the prevailing methods of financing research and higher education through general support of universities militated against selection of specific fields of research for emphasis. This trend has important implications for U.S. support of research in Europe. In some cases, joint planning, collaborative work, cost sharing and deliberate assumption of costs by European countries will be facilitated. In other cases, the European priorities will not coincide with ours, and it will continue to be in our interest to support research of direct concern to this country.

(b) Relative expenditures abroad by United States and other countries

The investments of Western European countries in research outside their borders is substantial. Eleven countries (England, France, Germany, Italy, Switzerland, Belgium, the Netherlands, Denmark, Norway, Sweden, and Finland) invest a total of about \$200 million per year in cooperative international research efforts, such as the European Center for Nuclear Research (CERN), the European Space Research Organization (ESRO) and others, and in the U.N. organizations. In total, they spend about \$30 million more outside their borders for research in less developed countries.

Most advanced countries spend a higher proportion of their total R. & D. investment outside their own borders than does the United States. The total U.S. investment in foreign research and development is about 0.4 percent (\$0.40 out of every \$100 of its domestic R. & D. expenditures). The United Kingdom spends about 1 percent of its total R. & D. investment abroad. These two countries are relatively self-contained. Then there is an intermediate group of countries, represented by Germany and Norway which spend more than 2 and more than 3 percent abroad respectively. Finally, there are countries which are at the high end. Among these are Belgium which spends 9.5 percent of its total R. & D. budget outside its own boundaries, and Holland for which the corresponding figure is 17 percent. A substantial part of the foreign research expenditures of other countries is represented by contributions to large collaborative international laboratories, such as CERN. Another substantial proportion is represented by investments in developing nations. None of these figures is precise, but they indicate that R. & D. expenditures abroad are not unique to the United States, and that in relative terms our foreign R. & D. expenditures are relatively low.

VIII. EFFECTS OF U.S. RESEARCH FUNDS ON GROWTH OF RESEARCH IN OTHER COUNTRIES

With this general perspective, it is clear that in total the R. & D. effort in Western Europe is not affected very much one way or another by the trend of U.S. expenditures in Western Europe. However, the actions of the United States have an effect that is more important than might be assumed from consideration of the sums involved. The reduction in U.S. funds for research has directed the attention of other countries to the scale and rate of growth of their research expenditures. The widespread discussions in and outside governments in Europe, Canada, and Australia have stimulated expansion of their research expenditures. The precise effect of this factor cannot be measured because so many more important factors are at work in other countries. Our policy is to continue the general trend toward reduced expenditures and to sustain close contact with other countries to insure that research in which we have an important stake will be financed.

IX. U.S. ADVOCACY OF EXPANDED R. & D. IN OTHER COUNTRIES

Apart from the question of U.S. investments in R. & D. in advanced countries, the United States has consistently advocated an expansion of effort in this sector as a wise element of national policy.

The general position of the United States, expressed in international conferences and in private discussions, has been consistent, and has been based in part upon our domestic experience. The United States has made considerable progress in strengthening its capabilities for the conduct of fundamental research and has substantially increased its research investments, both public and private. Still, this investment is much smaller than the amount spent for luxury goods

such as tobacco and liquor. The same obtains in many other countries. So when countries say they are too poor to afford fundamental research, the only conclusion can be to raise questions concerning the sense of values of their society.

We have indicated to the European countries that it is very important to make clear to the political members of governments, to finance ministers and indeed to the people who in the end must pay for research through taxes, that the values which those concerned with science hold to be so self-evident are, in fact, convincingly so to them, too. For this reason it is important that those who have responsibilities in governments seek to explain to the general public as well as to other government officials why it is important to increase national investments in fundamental research.

The United States has also stressed the growing importance of scientific cooperation, as contrasted with the financing of research by this country in other countries. Continuing intergovernmental consultation on national policies for the support of research is needed. Science has long been international in character, with its lifeline of advanced dependent on full and free communication among scientists. Many private scientific organizations have been devised to promote and encourage such communication in its many forms. With the acceptance by national governments of responsibility for support of research, there has come into view a pressing need and major opportunity for intergovernmental consultation to exchange experiences on national policies for the promotion of healthy growth of science within national boundaries and to explore possibilities for strengthening international cooperation in the conduct of research where this appears to be in the best interest of scientific progress. With the increasing costs of research and the relative scarcity of scientists of great ability, no nation can expect to be in a leadership position in all fields of science. It follows that the United States and other scientifically advanced countries must embark on a new venture of international consultation and cooperation that will permit our creative scientists to develop to their full potential.

Finally, the United States has stressed the significance of basic measures that are required in Europe if current apprehension in Europe over the advanced scientific and technological position of this country are to be alleviated. These include the reduction of tariff and other trade barriers, adoption of monetary reforms, and, in general, the measures prerequisite to the establishment of expanded markets. Apart from these general economic and political measures, European countries have inherited institutional forms, administrative forms and sets of values and priorities which tend to militate against the free and full development of applied science and technology—and to some degree the development of fundamental science.

In this situation, the interests of the United States are not best served by drastic shifts in policy toward support of research and development in Western Europe. The existing trend toward reduced support should continue at a rate which takes into account all of the factors noted above, including that not limited to the balance-of-payments problem.

As has been true in the past, the United States cannot be sure that expansion of research efforts in advanced countries will result in the financing of those areas of investigation in which this country has an interest. The prospect is therefore that a substantial investment in research outside the country will continue to be advantageous, even in the more advanced nations.

Dr. HORNIG. Mr. Chairman, I would like to briefly summarize the main points in my prepared testimony.

Of course, we are very conscious of the balance-of-payments problem but it is one of several criteria that must enter into our support of research abroad. We do support research abroad for a variety of reasons. Some of them are obvious, explicit, and have been mentioned to the committee before. For example, to study diseases in some cases they must be studied where they are endemic.

Some areas like oceanography span the entire globe. But more generally than that, the advance of this country depends on utilizing a continuously expanding pool of knowledge. Domestically we spend some \$15 billion each year on that. And in order to utilize it, it is not

important where it has been contributed. Precisely because we are a very advanced nation scientifically, probably the most advanced nation scientifically, we are in a position to take advantage of new knowledge, new techniques, new apparatus, and new approaches no matter where in the world they are developed.

Secondly, one could ask, why can't all of this be done at home, and I think the point should be made that research is not something that can be purchased from the lowest bidder. It is not in general a task which can be assigned and simply carried out. It is often a problem in puzzle solving and some people have the right ideas, the ingenuity, and can do it, and other people can't.

It is often advantageous, therefore, to turn to people who can put in the bits of puzzle that we need to advance when they are abroad if they aren't available in the United States.

In short, we are not, and I don't think can be, completely self-sufficient in science.

I should mention also that we are committed to helping the developing nations as a matter of national policy and the scientific and technological components of this effort are significant. Therefore, although we try hard to exercise restraint, I think that we will continue to be engaged with science abroad for the indefinite future.

I want to emphasize that our interest in supporting research in other countries does not arise from an interest in supporting research there per se but insuring that investigations important to us are carried on.

In the period immediately after the last war, of course, our interest was in the rehabilitation of Europe, and so there was a period of growing support until the early 1960's when we undertook to reexamine our policies. This was done in reports of the President's Science Advisory Committee and a study by the Federal Council for Science and Technology.

As a result, we have developed two kinds of controls. Government-wide criteria, stated in the Federal Council report, stating objectives, standards and terms and conditions for the support of foreign scientists, and dollar restrictions on the expenditure of major agencies. These two approaches are complementary. The restrictions on dollar expenditures have already been discussed. The general guides as to what is appropriate are formulated in the document "Policy Guidance for Research Investment Abroad by U.S. Agencies," which I have submitted.

(The documents referred to are as follows:)

THE PRESIDENT'S SCIENCE ADVISORY COMMITTEE—INTERNATIONAL SCIENCE PANEL

RESEARCH SUPPORT ABROAD THROUGH GRANTS AND CONTRACTS

SUMMARY AND RECOMMENDATIONS

A. Objectives

The Panel would single out the following four principles as the basic motivations that lie behind the U.S. support of research by foreign scientists overseas, and in fact, for U.S. participation in international scientific activities more broadly. We recognize that individual programs may be justified in some cases on narrower grounds encompassing only one or a few of these objectives.

1. To advance science and technology in the United States it is necessary to encourage wide contacts between American and foreign scientists, to engage in international scientific ventures, and sometimes to support scientists in other countries in their research;

2. To support our military effort and our general security objectives, it is essential to insure a strong scientific base in allied countries and to take advantage of scientific competence wherever it exists;

3. To support our foreign policy objectives, it is important to encourage international scientific contacts and activities in order, among others, to support the Western intellectual tradition, to maintain relationships with intellectual groups in the Communist world, to develop common goals and objectives with other nations, to strengthen international organizations, to enhance the scientific image of the United States, and to assist in the growth of the less developed countries;

4. To contribute to the long-term goals of the United States, it is necessary to perform a role in the advancement of science in all nations as a contribution to man's intellectual and material well-being.

B. Research support in furtherance of agency missions

1. The Panel believes research support programs carried out as contributing generally to the furtherance of agency missions when there is unique competence, equipment, or location overseas are clearly justified. These programs, though justified on the "narrow" grounds of relationship to mission have made and can continue to make important contributions to the broad objectives stated above as well as to agency missions.

2. However, as the programs grow in size and proliferate in numbers and geographical areas, the possibility arises that some of these programs may no longer serve these broader objectives. More attention must be paid to the programs, and a greater measure of control exercised when necessary.

The issues of possible concern have to do largely, though not entirely, with the effects of the programs on the host country. The Panel sees these issues as follows:

Duration of Programs

(a) The Panel believes that all overseas support programs should have as an ancillary objective encouraging the indigenous government to increase its own support for research.

(b) As a corollary, the Panel believes U.S. programs should not be considered as permanent programs; rather, the bulk of the programs should be designed to be phased out eventually as the host government is able to take over.

(c) As the host government's capabilities grow, emphasis of U.S. programs should be shifted to cooperative projects instead of unilateral support programs.

(d) The Panel suspects that in some countries of Europe, the situation may have reached the point at which some U.S. programs should begin to be phased out.

(e) To determine the appropriate policy in each country, the situation must be evaluated in detail to provide the basis for action.

Impact of Programs

In some countries, U.S. support programs may have an important impact on science planning, on education policy, on allocation of resources of the host government. The State Department must assume the responsibility of understanding the situation in each country and of creating a policy framework for agency activities.

Military Programs

(a) The reaction to the support of science by U.S. military agencies will vary from country to country and region to region. The State Department should make a judgment for each country about the desirability of a military support program on the basis of the local situation, the need for prompt action, and other factors.

(b) The Panel does recommend, however, that where military programs are authorized in countries in which programs do not now exist, it would be desirable to mount a civilian agency program at the same time and, in any case, to have the military operate out of an office staffed by civilians, preferably under the science attaché as is planned for Rio de Janeiro.

(c) We strongly recommend against the "flying contractor" type of operation, in which contracts are let from the United States as a result of occasional trips by a contracting officer.

Budget

The Panel does not believe that it is fruitful to try to define, in relation to overseas programs, when particular research does or does not contribute to an agency's mission. The problem exists for all research support by agencies, whether it is carried out in the United States or overseas. We do believe, however, that similar criteria should be used and therefore recommend that research supported abroad should be considered to be in competition with domestic proposals for available research money. This is not now the case in all programs.

*C. Means of determining policy**Overseas*

The Panel believes a much more effective mechanism is required overseas to provide information, evaluate the situation in each country, recommend policy and overall program changes, and implement policy decisions.

We recommend:

1. A greatly strengthened and expanded science attaché program, particularly in those countries or regions in which there are extensive U.S. scientific programs;

2. That the science attaché be given responsibility to provide the information, evaluation, guidance, and policy implementation required, and that he make use for this purpose of the assistance the agency representatives in those countries can provide;

3. That, in recognition of the difficulty of recruiting sufficient numbers of non-Government scientists as attachés, Government agencies be asked to provide scientists to State to serve as attachés;

4. That, when appropriate, agency scientific representatives stationed overseas be named as deputy science attachés, or as science attachés where none exists, to carry out this function.

Washington

To provide more effective guidance and policy formulation in Washington for these programs, the Panel believes the Office of the Science Adviser in the Department of State should play the key role, using the International Committee of the FCST to assist.

We believe this Office in the State Department should be greatly strengthened to be able more effectively to meet the present-day requirements of establishing a foreign policy for science and integrating scientific factors into foreign policy formulation. In a separate paper we propose major strengthening of the Science Office in the Department of State.

D. Desirable research support programs not covered by existing policies

Concentration only on supporting research overseas generally related to the missions of U.S. agencies and competitive in quality with the best domestic work leaves many gaps where, for a mixture of scientific and foreign policy purposes, the U.S. Government should be active. Support in other countries primarily for economic development purposes can, at least theoretically, be budgeted through the foreign aid program. There are many other examples, however, in which particular research proposals would not, if granted, directly contribute to economic development and at the same time do not fall strictly within the missions of U.S. agencies or are not competitive in quality with domestic proposals. We have no regular means in the U.S. Government at present for examining such proposals and supporting them if in the U.S. interest.

1. The Panel recommends that the NSF be authorized to seek funds for international activities that fall in this gray area between research supported because of relevance to U.S. agency interest and that supported to further our foreign aid objectives. Most of those in this category would be justified for a combination of foreign policy and scientific objectives.

2. In addition, the Panel recommends that in those fields directly related to human welfare—in particular the life sciences—research support abroad should not need to be exclusively tied to a domestic U.S. health or agriculture problem. This can most easily be accomplished immediately in the Public Law 480 program.

3. The Panel recognizes the difficulty of setting criteria and budgetary limits on the overseas support programs when they are not related to the mission of

an agency. We believe, however, that satisfactory criteria and procedures could be established.

E. International Committee, FCST

The Panel finds itself in general agreement with the recommendations on this subject made in the report entitled "International Scientific and Technological Activities" of the International Committee of the Federal Council, and strongly endorses that section of the report.

Discussion

I. BACKGROUND

Scientific research and the technology that has flowed from the results of the research have had enormous impact within this Nation and on our relations with others. The importance of the scientific vigor of the country, the relationship to our national strength and security, and the steadily increasing magnitude of the cost of research, have led to the general acceptance of the provision of major support for science in the United States as a necessary and natural function of the Federal Government.

Science of course cannot realistically be spoken of as a "national" activity, for its successful advancement has always depended on contacts among scientists of different nationalities, the discovery of natural laws has universal application, explorations in various fields of science necessarily cross national borders, and the products in terms of technological application affect all. Thus, as the Federal Government expanded its support of and involvement in research, it inevitably found itself engaged in one way or another in international activities. It certainly found that the results of the research affected the international relations of the country—this is, after all, largely the objective of the research sponsored for security objectives. But more than that, it found that it was necessary to sponsor international scientific expeditions, enable American scientists to participate in international conferences (and even help support their international organizations), bring foreign scientists to the United States, cooperate with other nations in conducting experiments of interest to us, and finally, enlist the scientific resources of friendly countries where our own resources were inadequate.

More recently, other considerations beyond the scientific became important factors in the international scientific activities of the Federal Government: The research potential of our allies needed rebuilding if those countries were to become once again strong and viable economically and militarily; our efforts to aid the less developed countries called for scientific and technological as well as economic assistance; the image of our Nation's scientific achievements became an important element in international political affairs; the conduct of research on a cooperative basis and the relationships normally established in the international scientific community were realized to be useful political instruments to develop common objectives with other nations and to make meaningful contacts with influential groups in alien societies.

Broader objectives have also motivated these international scientific activities of the Federal Government though they are rarely stated explicitly because of the usual need to justify expenditures by direct self-interest considerations. The motivation to advance science in the interest of man's general welfare is one of these; another is the conviction that science is a common intellectual culture and hence its worldwide health and vigor are legitimate concerns of this Nation.

The Federal Government's scientific activities overseas that have been fostered for these various reasons have largely developed as individual agencies of the Government have seen the need in the light of their own mission. This is the historical course of development of U.S. Government activities generally, and fortunately so when it results in dynamic programs conceived for clear end purposes, with full legislative participation and approval.

Of course, this pattern of development also creates its own problems as programs grow in size, overlap among agencies occur, or political problems once unimportant become significant. Perhaps more serious, such development does not provide a built-in mechanism to insure that the full opportunities for U.S. policy and for U.S. long-term objectives are being realized.

To a considerable extent we are in this period now where the programs have grown in size and variety to have important effects on foreign policy and yet without sufficient central guidance and stimulation that is required. The Panel

commends the work of the International Committee of the Federal Council in its intention to provide that central guidance and stimulation.

Of the various kinds of scientific activities in which Federal agencies participate in an international environment, the Panel has singled out the support of research by foreign scientists overseas for special attention and study at this time. These programs, which in fiscal year 1962 were on the order of \$25 to \$30 million per year, have been growing slowly but steadily since they were begun in Europe by the American military following World War II. The total support has recently been growing rapidly, with active programs conducted by at least five major Government departments and agencies. The programs in this category of the Department of Health, Education, and Welfare, for example, went from \$100,000 in 1955 to \$8 million in 1961 and to an anticipated \$12 million in 1962. The Department of Agriculture program has fluctuated widely, being some \$3.5 million in 1960, \$33.5 million in 1961, and \$5 million in 1962, the fluctuations in part being due to changes in policy with respect to use of foreign currency, and the fact that some of the contracts will run for a period of several years. Perhaps more important as an index of the impact abroad, in one advanced country the money available for research in some fields from U.S. Government sources amounted to as much as the funds available from within the country.

The policy issues raised by these research support programs are of considerable importance, and though some of the issues are unique to this category of program, many of the Panel conclusions and recommended guidelines will apply equally to other kinds of international scientific programs.

II. BASIC MOTIVATIONS

The Panel starts with an underlying attitude, derived from the general considerations given above, that it is appropriate and desirable for U.S. Government agencies to be engaging in international scientific activities. We accept the view that it is in the interest of the United States to assist in the advancement of science and its peaceful applications beyond our borders as well as inside, and that it is particularly important to establish and maintain close relationships with scientists in all countries. The Panel would list, without elaboration here, what it views as the relevant basic motivations for the U.S. Government as follows:

1. To advance science and technology in the United States, it is necessary to encourage wide contacts between American and foreign scientists, to engage in international scientific ventures, and often to support scientists in other countries in their research;

2. To support our military effort and our general security objectives, it is essential to insure a strong scientific base in allied countries and to take advantage of scientific competence wherever it exists;

3. To support our foreign policy objectives, it is important to encourage international scientific contacts and activities in order, among others, to support the acceptance of the Western intellectual tradition, to maintain relationships with intellectual groups in the Communist world, to develop common goals and objectives with other nations, to strengthen international organizations, to enhance the scientific image of the United States, and to assist in the growth of the less-developed countries;

4. To contribute to the long-term goals of the United States, it is necessary to perform a role in the advancement of science in all nations as a contribution to man's intellectual and material well-being.

The Panel believes, in principle, that for the foregoing reasons, it is proper and, indeed, necessary that the U.S. Government provide support for the research of foreign scientists.

However, we also believe that the U.S. objectives in the provision of such support should lead to certain constraints on the form, patterns, and duration of support.

In the discussion that follows, and the conclusions we draw from that discussion, the Panel finds itself in firm agreement with the conclusions reached by the International Committee of the Federal Council on the same subject as part of their report, "International Scientific and Technological Activities." In some cases, this Panel has gone beyond the recommendations of section IV-A of that report, but we strongly endorse the points it makes.

III. RESEARCH SUPPORT IN FURTHERANCE OF AGENCY MISSIONS

A. Program objectives and results

The bulk of the U.S. overseas research support programs has been justified as being necessary, or at least useful, in the light of the mission of the particular agency. In practice, the agencies, when providing support, have required the foreign scientists to have some special capabilities in terms of location, competence, or facilities in order to compete on scientific grounds with domestic proposals. The Department of Defense wisely modifies this "uniqueness" criteria to some extent with the justification that it is in the military interest of the United States to broaden the scientific base of military programs so as to enlist the competence and the ideas that flow from close relationships with good scientists wherever they may be located.

Even though these programs are motivated on the "narrow" grounds of relationship to mission, they are not, of course, without their impact on U.S. foreign policy, and on the basic objectives for U.S. international scientific activities listed by the Panel in the previous section. All of the agencies cite positive ancillary effects.

U.S. support, it is believed, has been an important factor in many countries in increasing the consciousness of the importance of scientific strength, and thus increasing the level of domestic support provided for research. In many cases, U.S. support has helped to keep good scientists fully productive in their research, and thus prevented frustration and dissatisfaction during a period when the indigenous government has been unable to provide full support itself. As a corollary, U.S. support has worked to encourage scientists to remain in their native countries rather than migrate to the United States or elsewhere in the hope of finding support for their work. The ability to bring scientists working on U.S. grants or contracts to the United States for visits during the work has also served to increase their contacts with U.S. scientists and others. American support has helped to identify and support promising younger scientists, and has made it easier for outstanding people to take on more graduate students and thus train larger numbers. Lastly, the military support has apparently had some effect in developing, in Europe, a better understanding by scientists of the appropriateness of military support for basic science.

The Panel believes the mission-oriented motivations that have led to these support programs are sound, and that the overall impact of the programs has been, on the whole, good. We would go further and comment that these programs, even though begun for narrow objectives, may have had the effect of demonstrating for the United States as well as for other countries that governments can support science across national borders effectively, and to a measure disinterestedly for the good of all men and nations. The pattern that these programs began—of one nation supporting science in another—may prove to have been their most significant contribution.

Today, however, the Panel finds itself with a measure of concern about some aspects of these support programs as they grow in size and number, as the conditions change in other countries and in the United States, and as the focus of need moves to countries in different stages of development. We do not believe that the United States should assume an unquestioned obligation to support the research of all excellent foreign scientists in response to interesting proposals related to the mission of a U.S. agency. Yet, to some degree we are doing this now. In effect, we must recognize limitations and constraints, even for programs in support of agency missions, limitations and constraints that flow largely from foreign policy and budgetary rather than scientific considerations.

*B. Limitations and constraints—Policy issues**Duration of Programs*

The Panel considers that one of the objectives that should accompany all of our research support programs overseas is the encouragement of the indigenous government to increase its own support of research. It should be understood that we expect the local government, when it is able to do so, to take over a major part of the research we are supporting.

In the early days of U.S. support in Europe, our programs filled an important gap, but as a result of the rapidly advancing economic situation in Europe, we wonder if in some countries our programs today may not be working against full assumptions of responsibility for research support by the indigenous gov-

ernment. Where that may be the case, the Panel believes the United States should plan over a period of time to phase out the bulk of its support. The problem, of course, is how to get a fair evaluation of the situation in each country, and we will have something to say about that below. But, where phaseout by the United States is indicated, plans should be carefully made with the local government so that there will be no sudden transients or hiatus. It is worth noting that such discussions, even if they lead only to an indication of eventful reduction of U.S. support, will serve to alert the local government to the need for them to expand their own support.

This recommendation by the Panel is made, recognizing that one of the justifications the military has for their European programs is to broaden the base of scientific support for U.S. military objectives. We believe this to be a valid objective, but one that has been met in some part and that does not, in any case, override other considerations. In addition, we feel that a good bit of this contact can be obtained, and even enhanced, by working through NATO.¹

It may be wise to assert once again that the Panel believes it to be appropriate and important for the U.S. Government to be engaged in scientific activities, even in Europe, but that what it is concerned about is unending unilateral support by the United States to scientists in countries able and with the responsibility to provide their own. Our objectives, as spelled out earlier, should lead us in a different direction; namely, to emphasis on cooperative projects and support of research. Cooperation can be multilateral or bilateral, but it should involve investment by all parties concerned. We particularly note and commend the NASA overseas program in which they have insisted on local support for cooperative projects.. It is interesting to observe that when it becomes apparent that dollars will not be made available, local funds are often found. This principle should not and cannot be extended to all programs or all countries, but it certainly should be applicable in some of the countries in which we now provide research support funds.

We would suggest an attempt in the European scene and especially in those countries in which we intend to reduce support, to encourage our scientists to plan projects jointly and to submit a joint proposal to both governments. Then, U.S. support would be coupled with government support by the other country, and the research scientists involved would inevitably be well integrated. Such joint planning and submission of proposals does not happen automatically; it would be of great value if the agencies actively encouraged such planning, and provided the necessary support for travel and meetings that might be necessary.

Impact of Programs

In the less advanced countries, where we have now or are planning to support research related to agency missions, the elements of the situation are quite different. Here, the number of capable scientists is much lower, and the inability of the government to provide adequate support itself is clearly evident.² Yet, by the same token, the impact of U.S. support to individual institutions or scientists will have a much greater effect on the scientific plans of the country, and is likely to be much more "visible."

For these countries, the Panel takes a strong general position that the provision of support by the United States for research by competent scientists is a highly important activity and should be encouraged wherever appropriate.

Yet there are dangers here that also must be avoided. One, it seems to us, is the problem of unintentionally impeding the development of a country instead of contributing to it. Agencies will be supporting individual scientists because their work related to the agency's mission, but in so doing if the research keeps scientists from teaching or keeps them from other work that should have priority, the ancillary results may be undesirable. In some of the larger of the less developed countries—India, for example—there is some feeling that the availability of U.S. money encourages more people to devote themselves to basic research than the country can afford. Whatever the merits of the

¹ The foregoing recommendations are not meant to apply to the ONR scientific liaison function in London, or to development programs like MWDP.

² We are excluding from this discussion support given by the United States where the primary purpose is development aid; rather, we are concerned here with support provided to good scientists primarily for their expected research contribution to an agency mission. The diving line is not sharp nor are the results necessarily different, but foreign aid for science development is another issue deserving separate discussion.

concerns in particular cases, it seems clear to us that it is not proper to take the approach that any good scientist willing to be supported in a field of interest to a U.S. agency, should receive such support. And this remains valid even if the local government has first given general permission for the United States to support its scientists.

The Panel is aware that there are many dangers in trying to second guess whether a particular grant will or will not have a long-term beneficial effect, and there are certainly dangers inherent in looking to the local government to make such a decision, but that does not in turn mean that a completely laissez-faire attitude is the correct one.

The only answer to this is that the U.S. Government and particularly the Department of State must be in a better position than it is now to evaluate local situations, to monitor programs, and to establish policy direction on a country or regional basis. We comment on this further below.

Military Programs

One of the issues that has been raised within the U.S. Government and in other countries as well, is whether or not the U.S. military should be engaged in the support of basic research by foreign scientists in other countries. There is no question, in the opinion of the Panel, about the appropriateness of military support for research within the United States, nor about the success of the programs that have existed in Europe for many years. We do have considerable concern, however, about further extension of the military programs to the less developed regions of the world and to Japan.

We believe the bulk of the military programs in Europe should be governed by the considerations discussed earlier in this paper for all overseas Federal research grant and contract programs. In Latin America and Japan, and to some extent in the more backward European countries, the Panel believes it would be unfortunate, in terms of our other objectives, if the United States presented the appearance that it is primarily for military purposes that the Government supports science.

We find the question of military support in some countries a difficult one to judge. We are anxious to see increased U.S. scientific support in Latin America and in Japan for the objectives stated earlier for these programs, with the added need to show some action under the Alliance for Progress in Latin America. The Department of Defense is prepared to mount programs more quickly and in some cases more ably than civilian agencies; yet, over the long term, the net effect may well be inimical to our objectives. On the other hand, long delay in providing effective support may also be inimical.

In this situation, we see no alternative but to insist on a considered country-by-country judgment by the State Department of the likely effect of military operations in science in the countries of interest; and then to follow this with close control of the operations, and integration with the Embassy and other U.S. agency activities. We specifically recommend against the "flying contractor" type of operation, and do not believe clearance with the military attaché at a local embassy constitutes sufficient consideration.

Rather, where it has been determined that a military operation is justified, we believe it should be carried out under the aegis of a civilian office, established preferably under the direct supervision of the science attaché. And, wherever possible, we believe the military should not be the only agency providing science support in a given country or region. One or more civilian agencies should also have programs in parallel with the military.

The Panel would also raise the question, even for the European countries, as to whether it would be possible for the military eventually to operate their programs through a civilian agency, such as NSF, when a civilian agency is able to do an equivalent competent job. We understand the reasons that have been raised as to why this is not possible (relation to mission, contact with scientists, etc.), but are not convinced that the possibility has been considered seriously enough.

Budget

We have been discussing mission-related research overseas, but have made no attempt to set out criteria to determine when a given piece of research is "mission related." This, of course, is an essential step, and relates directly to the budgetary problem of establishing the amount of money available for research. This is exceedingly difficult to do, but is no different for overseas programs than

for domestic programs. The control is exercised in part by forcing overseas proposals to compete substantially for available research money in an agency with domestic proposals, as is now done in almost all agency programs. The Panel believes this is the only appropriate way to handle this problem for mission-related research, and believes the practice should be the same throughout the Government.

C. Means of determining policy

Overseas

In discussing these overseas research support programs, and attempting to evaluate the impact of the programs in other countries as a basis for policy recommendations, the Panel has been struck by the lack of information about and evaluation of the detailed situation in each country. We have also been impressed with the need for greater recognition that these overseas scientific programs have come to have an important relation to U.S. objectives in other countries, and hence require well formulated and clearly understood policy guidance on a geographically broad basis, and integration overseas on a continuing basis with U.S. foreign policy operations. The beginnings of the necessary mechanisms exist but need strengthening and need a specific mandate for responsibility for this area.

It is our opinion that the State Department must have the responsibility in the field to evaluate the situation in depth, to guide the programs, and to make specific recommendations for policy. The Department should be responsible, in consultation with other Government agencies, for determining, for example, the future course of the support programs in Europe; that is, whether they should be phased out or receive different emphasis; for guiding the programs in the less advanced countries so that they do not hinder but aid those nations; and for judging the real situation with regard to military support of science in a specific country.

We believe this should be the responsibility of the science attachés, recognizing that to accomplish this will require strengthening of the science attaché program. It is unrealistic, of course, to imagine stationing high-caliber scientists recruited from outside the Government, at most embassies. Rather, we believe this can be accomplished by recruiting additional attachés on loan from other U.S. agencies, and by using Government scientists stationed overseas as part-time science attachés for the Ambassador in a particular country. Both of these measures will serve not only to make available to State more people than they could recruit themselves, but would also enhance agency activities by involving more scientists in foreign policy matters.

In each country, or region, we would envisage that the science attaché would use the agency scientists stationed in his area as a team under his guidance to provide the information and the evaluation needed. In turn, this group would be the means by which agreed policy with regard to that area would be implemented.

It would be wise, in addition, to have regular meetings in Washington of all the science attachés to discuss policy guidelines and common problems.

Washington

In Washington, we believe the science adviser to the Secretary of State should play the key role in working with the operating agencies to set policy based on the information and evaluations from the field, and to coordinate operations and implementation of policy. In this, the International Committee of the Federal Council for Science and Technology, chaired by the State Department, can help considerably. The Panel believes agencies can usefully provide personnel in Washington on loan to assist the science adviser.

We would go further and say that in the light of the greatly expanded interaction of science and foreign policy, of which the subject of this paper represents but one small part, the role of the science adviser in the State Department needs to be greatly strengthened and expanded. The Panel will devote a separate paper to this matter, but cannot stress too often its conviction that as science becomes a steadily more significant part of the relations between nations, the ability of our Department of State to formulate foreign policy for science and to integrate scientific considerations into policy formulation must be correspondingly improved.

IV. DESIRABLE RESEARCH SUPPORT NOT COVERED BY EXISTING POLICIES

So far, we have discussed only research support overseas when it is generally related to the mission of the supporting agency and competitive in quality with the best domestic work. We have pointed out that these programs, even though justified on narrow grounds, do inevitably have an impact on our foreign policy objectives, and particularly on those basic objectives, stated earlier, that the Panel believes the U.S. Government has in furthering international scientific activities generally.

But now anomalous that we have no ready means to carry out research support programs, or other scientific activities, when they are clearly justified for foreign policy reasons, represent good science, but may not fall within the purview of a single agency's mission or are not given adequate consideration in the competition for funds because there is no means to give some weight to the foreign policy factors.

Those programs that should be carried out for purposes of furthering the development of other countries can be recognized and supported through the foreign aid budget; hence, a mechanism, even though a theoretical one at the moment, does exist there. But in the gray area between development aid on one side, and mission-oriented research on the other, the area in which foreign policy considerations are important and the science is good but not sufficient in some respect to merit a claim on a mission-oriented budget, no adequate mechanism now exists.

Theoretically, the Department of State could request funds for programs in this gray area and then transfer them to the appropriate agency to carry out. This has, in fact, been done, for example for the SEATO cholera laboratory in Pakistan. However, for practical reasons this can only be a limited route, and would not fully answer the needs in any case since in this gray area, foreign policy considerations are not always the dominant ones even though they will clearly be important.

The National Science Foundation is the only Federal agency charged with looking after the health of science as a whole. It is the judgment of the Panel that the NSF should be given the authority to request funds for international activities such as the support of research abroad that would be carried out in this gray area of mixed scientific and foreign policy objectives. Necessarily, these funds should be administered separately from those for domestic purposes.

Further, we would recommend that those agencies such as Agriculture and HEW that are working in fields directly related to human welfare be given limited responsibility to support basic research that further their fields of emphasis whether or not the practical application of that research is tied to a problem encountered in the United States. In other words, NIH and Agriculture should be able to support research in other countries related to the needs of those countries, such as tropical medicine or agriculture, even if there is no direct relationship to a U.S. need in those subjects.

The practical difficulty here is an obvious one: What criteria can be established to determine what is eligible for support? What are the limits to this authority? Who is to determine what should be supported and to what extent? Clearly, these cannot simply be competitive with U.S. programs, for they involve other considerations as well, and to the degree we support research outside the United States, we may be reducing the funds available within the United States. (Note: For the Public Law 480 program, which already uses different criteria for selection of programs since it is not competing with U.S. domestic research funds, we believe the restriction of pertinency to a U.S. domestic problem could be removed without raising technical difficulties.)

The Panel does not have a ready answer to these questions and believes such criteria and operating practices can be developed only through experience and experiment. Obviously, the State Department must have a major role in helping to determine what is justifiable, and what is not. But, beyond that, it may be necessary to force the requisite degree of competition between programs and an attitude of responsibility on the part of the agencies through budgetary means. One way of proceeding is to allocate a fixed sum to an agency for overseas programs of the kind we are discussing here—nonmission oriented—to force the agency to determine with the help of the State Department which programs have the highest priority on policy and scientific grounds. The other alternative is to agree in principle that some overseas programs of this kind can be

legitimately requested, and then review each on an ad hoc basis, with stringent justification requirements.

Neither course is simple, and the Congress may demur in any case, but the Panel firmly believes that to meet the international objectives of the United States we have reached the point at which some provision must be made for U.S. Government scientific operations overseas on a broader base than simply relationship to the domestic mission of a Federal agency.

POLICY GUIDANCE FOR RESEARCH INVESTMENT ABROAD BY U.S. AGENCIES

STATEMENT BY THE INTERNATIONAL COMMITTEE, FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY¹

I. GENERAL U.S. INVOLVEMENT IN SCIENCE OUTSIDE THE UNITED STATES

The United States is involved in a wide range of scientific activities conducted in foreign countries, including investment in research conducted by foreign scientists. This involvement is a fundamental necessity, because our scientific community cannot remain aloof from the world of science without paying a penalty in terms of wasted and ineffective effort and missing new advances useful to our society.

The Government of the United States, whose science activities constitute an important part of the broader total of national involvement, must be concerned with research outside this country. First, scientific progress contributes to the economic and cultural development of all countries, and in this and other ways advances the interests of the United States. Second, this involvement is essential to the attainment of the statutory objectives of a number of agencies. The following is directed to this latter aspect.

II. INVOLVEMENT TO ATTAIN AGENCY OBJECTIVES

Today scientific excellence is widely dispersed and the programs of Federal agencies will be hampered if they remain aloof from scientific contact with foreign laboratories. Major areas of inquiry, such as oceanography, geophysics, and meteorology, take meaningful form only on a broad regional or global basis.

In addition, there exist outside our borders unique opportunities in the form of natural conditions, unusual materials, unusually well-qualified people and specialized facilities. These factors which characterize the contributions from research carried on outside the United States are at the same time the criteria which define the types of foreign research with which the Federal technical agencies should be involved.

The statutory objectives of these agencies include many vital matters: defense of the Nation; protection of the health of our citizens; increase of manufacturing and agricultural productivity; enhancement of special efforts, such as scientific and industrial exploitation of nuclear phenomena, and the conquest of space. Technical agencies are not involved in research outside the United States to provide assistance to other countries; this is in the province of the Department of State and the Agency for International Development.² Rather, scientific capabilities in other countries are used for the attainment of domestic missions. Agency involvement for this purpose takes the form of—

- Direct oversea operations, such as tracking stations or health laboratories;
- Research procurement by contract with foreign laboratories;
- Collaborative arrangements with other countries; or
- Investment in research of interest to United States through grants to foreign investigators.

¹ This statement reaffirms the basic principles stated in the Federal Council of Science and Technology report of June 20, 1961, "International Scientific and Technological Activities," and the report of Sept. 4, 1962, by the International Science Panel of the President's Science Advisory Committee, "Research Support Abroad Through Grants and Contracts," and amplifies them only insofar as is indicated by accumulated operating experience and changing economic circumstances in this country and abroad.

² This also becomes a matter of concern to the technical agencies since legislation as well as sound management dictate the use of technical agency capabilities in State and AID programs when appropriate. These aspects are not treated in this paper.

In addition to the usual rules of good management which help to assure the efficient use of U.S. funds, agencies are expected to limit expenditures for scientific activities abroad in light of the U.S. balance-of-payments situation. In line with present policies on minimizing U.S. outlays overseas, emphasis should be placed on encouraging foreign support of research, developing joint U.S.-foreign projects, and consideration of domestic projects in lieu of foreign ones. Agency involvement in oversea activities does not necessarily include financial assistance to foreign institutions or laboratories: the vital interest of the Federal agencies is in insuring that the research meets essential U.S. requirements, that it is done, and that it is done well. In the last few years there has been a growing ability and tendency in many countries to expand indigneous investments in research. Thus, some of our objectives are being met without the expenditure of our funds.³

III. AGENCY INVOLVEMENT AND U.S. FOREIGN POLICY

The structure, vigor, and direction of scientific development within a foreign country can be affected by—

- The extent of our total involvement;
- The rate of change—upward or downward—in the volume of U.S. funds invested;
- The degree of concentration of these funds in individual institutions;
- Specific agency administration practices; and
- Compatibility of our research goals with the priorities of the foreign country.

An agency's desire to accomplish certain scientific goals is part of and in turn affects other aspects of our foreign policy objectives. A close relationship with the Department of State must be maintained to insure the fullest accord between agency program needs and U.S. foreign policy considerations.

With the guidance of the Department of State agencies should endeavor, through consultation with appropriate officials of the foreign country, to insure that their activities are in consonance with the general "science ecology" of the country. Agency involvement often enhances the general condition of science within the foreign country, and agencies should generally try to maximize ancillary benefits to the foreign country. Among such benefits are—

- Stimulation of support for science from indigenous sources;
- Strengthening of relationships within the world community of science;
- Improved recognition and status for science.

In this light, agencies should take the following measures in developing foreign programs:

1. Emphasize the development of collaborative efforts involving local support of the foreign component of the program;
2. Urge that all possibilities of indigenous support for a desirable project be thoroughly explored before providing U.S. support;
3. Insure that the administration of the grant, contract, or agreement is in consonance with the prevailing policies and practices within the country.

IV. INTERNATIONAL ECONOMIC CONSIDERATIONS OF RESEARCH SUPPORT ABROAD

General economic factors, in the United States and overseas, legitimately affect the volume of Federal money spent for research abroad. The continuing need to economize and the U.S. balance-of-payments situation are factors affecting the proper magnitude of investment in overseas science.

Grants or contracts for research outside this country are justified in advanced countries because a generally favorable economic situation in a foreign country does not in itself insure that research of high priority to Federal agencies will be given a high priority by the foreign country. Also, there is no assurance that cessation of U.S. support of specific research in a country will result in the financing of that research by that country. The proper course of action in this circumstance is to press for expansion of research support by the foreign country, but to bear in mind the importance to the United States of insuring that selected research is indeed carried forward.

³ This paragraph amended December 1964.

V. ADMINISTRATION OF RESEARCH INVESTMENT ABROAD

Several practices and policies should be adopted by the agencies:

Relevance to missions

1. Foreign research support should be limited to projects which are of the highest relevance to an agency's mission and which can be carried out more effectively outside this country.

Efficient and economical administration

2. Administrators have a responsibility to obtain the best research at the lowest cost and to inculcate cost consciousness on their staffs.

3. Foreign research agreements should: provide payment for indirect costs only when necessary; include practicable "Buy American" clauses; minimize payment for international travel; provide payment in excess U.S.-owned foreign currencies whenever possible; exclude payments for import duties on equipment or supplies.

4. Grants or contracts should normally make use of existing facilities as opposed to creating major new foreign-owned facilities.

5. Individual projects involving large sums of money (e.g., \$100,000 or more) should be formally reviewed by a higher level in the agency than that normally involved.

6. Research funds should be made available in advance only if necessary to the orderly progress of the work, and then in the minimum amounts required.

7. Research agreements should have the minimum duration required for effective prosecution of the work, and extension of support should be based on a careful review of the work to date.

VI. GENERAL LIMITS ON AGENCIES' FOREIGN RESEARCH EXPENDITURES

Where the scale of an agency's support of foreign research warrants it, the total amount of money which each agency should devote in each year to financing of research outside the United States should be derived from a carefully designed plan for such activities. This plan should spell out the considerations which require the agency to become involved with scientists and research in other countries. It should deal with the totality of the involvement, and not be limited to those aspects of the relationships which involve expenditures. The plan should spell out details for the near future, and provide general operating principles and a guiding philosophy for the more remote future. The plan should also provide dollar levels of support, proposing specific levels for the near future and reasonable ranges for the more remote future. The missions of the agencies, and the nature and degree of their involvement with science outside the United States, vary so widely that the plans of the agencies will also vary widely, but such plans must, in all cases, take into account the seriousness of the balance-of-payments situation.³

As part of the process of budget formulation, plans should be made known to the Bureau of the Budget in appropriate detail and at appropriate intervals. The following principles are relevant in judging the proper magnitude of research expenditures abroad:

1. The choice of an agency to spend its research funds in the United States or outside the United States is basically a technical program decision, and other considerations are secondary.

2. Financing of research outside the United States may be a species of foreign aid where the agency charter permits, but for technical agencies, it is a means of attaining agency objectives.

3. Economic conditions in this and other countries legitimately affect but should not solely govern the level of research expenditures outside the United States.

4. Changes upward or downward in the level of support for research in foreign countries should be gradual.

Scrutiny of agency plans, to insure that the criteria stated in this document are in fact observed, is a proper part of the budgetary process, and is expected from the operating agencies.

³ This paragraph amended December 1964.

VII. ADDITIONAL ASPECTS OF AGENCY INVOLVEMENT IN FOREIGN RESEARCH

Although Federal agencies become involved in research in other countries to further their statutory missions, this involvement can yield ancillary benefits to this country:

Furthering our foreign policy objectives through increasing international scientific contacts, developing common goals with other nations, enhancing the image of U.S. science abroad and by assisting developing nations;

Strengthening our general security by insuring a strong scientific base in allied countries;

Contributing to our long-term goal of bettering man's intellectual and material well-being;

Enhancing the opportunities for advanced training of U.S. scientists in research facilities outside the United States.

Agencies should administer their foreign scientific programs and activities so as to obtain maximum contribution from these ancillary benefits.

Conversely, agency support of research abroad should not hinder the development of U.S. capabilities and facilities in the same field. Care must be taken that this research support enhances rather than inhibits the development of American science.

Dr. HORNIG. Now, we have not reviewed in detail one by one the various projects which the various agencies support abroad. I think the most important factor in setting standards for observance is the general quality of the administration of grant and contract programs. In our judgment the sense of responsibility and sense of public accountability, the probity and quality of judgments which characterize these programs has been high. The agencies responsible for the largest overseas research expenditures have adopted specific supplemental administrative measures which are intended to limit research expenditures abroad, to stretch the dollars and to insure that the investigations that are financed are above average quality and relevance.

And these are consistent with the general Federal guides.

I think the task, then, of the agencies is to select foreign research which is of the highest significance to their missions and of the highest scientific quality.

Now, in this situation the interests of the United States are best served if the choices are made with a full knowledge of the interests and competence of foreign investigators. When these laboratories and investigators are known, Federal agencies sometimes take the initiative in seeking them out. But often foreign investigators apply for support upon their own initiative.

Now, no matter who takes the initiative, the same criteria of relevance and excellence are taken into account. Within each agency all applications from foreign sources are in competition with each other and with applications from U.S. citizens. The suggestion has been made that certain research projects might be postponed on the grounds that the interests of the United States would not be harmed if prosecution of the investigations were postponed until the balance-of-payments situation improved.

Now, of course, since the expenditure total has been declining, projects have been postponed that might have been financed if the criteria for award and fiscal limitations had not been imposed. This judgment has been made to some extent by the agencies. However, I should add that research being what it is, it is very hard to say in advance what would be lost by postponement until the results are in,

until one finds out what one knows that is important to our progress that might not have been known if the research had not been pursued.

I think, though, that in general I would simply emphasize that we are satisfied that the judgments as to excellence and relevance are made intelligently and responsibly by the agencies of the Federal Government.

Now, one other point I would like to make is that on grounds of simple ability to pay, there is no question that the advanced countries, the prosperous countries taken as a whole, could provide the additional funds equal to the amount of the U.S. investment abroad.

However, it does not follow from that fact that the countries would finance the specific research which is considered to be of high priority and interest to the United States, and this is true for a number of reasons, but the most important one is that their priorities in general don't match ours. The things we feel we need to know are not necessarily the things they feel are important to them.

Finally, I would like to emphasize that the Western European countries also do invest substantial amounts outside of their own borders: 11 countries invest a total of about \$200 million a year in cooperative international research efforts. They spend another \$30 million more outside of their borders for research in less developed countries.

None of these figures, I must say, are precise. They are approximate. But they do indicate that R. & D. expenditures abroad are not unique to the United States. In fact, in relative terms, our foreign R. & D. expenditures are low.

Lastly, I would mention that the reduction in U.S. expenditures in recent years has attracted the attention of other countries, particularly in Western Europe, to the scale and rate of growth of their own research expenditures. This has provoked a widespread discussion and has stimulated expansion of their research expenditures, so as we fade out they are picking up.

The United States has consistently advocated an expansion of their own effort. I think you are aware, Mr. Chairman, that at the recent OECD Ministers meeting I made a rather strong point of the necessity of their taking the steps they need themselves to build up their scientific and technical efforts.

Nevertheless, I don't think the interests of the United States would have been served by further sudden shift in our policy toward this important research and development in Western Europe.

The existing trend is toward gradual reduction and phasing out of many expenditures, taking into account the factors noted above, and these include the balance-of-payment problem.

So that for all of the reasons I have mentioned, we will continue to examine more carefully what we are doing. There probably will be a further phasedown but because we have a real genuine interest in the research abroad for a variety of reasons, I think the prospect is that a continuing investment in research outside this country will continue to be advantageous, even in the more advanced countries.

Thank you.

Mr. REUSS. Dr. Hornig, you say that our research expenditures have gone down. According to the figures I have, the total foreign research expenditures of the agencies that accomplish them, Department of

Defense, HEW, National Science Foundation, Atomic Energy Commission, have gone up from fiscal 1962 when they were \$23,737,000 to the current fiscal year, 1966, when they are \$28,514,000. Is it not a fact, therefore, that they have gone up rather than been reduced?

Dr. HORNIG. Mr. Chairman, I think one has to look at these figures in somewhat more detail. Certainly the total has gone up very slightly.

Mr. REUSS. Well, it has gone up by more than 25 percent at a time when everything else was going down.

Dr. HORNIG. This is correct. But in the—I think in the research areas as opposed to Department of Defense cooperative programs—perhaps I should put it differently. In the table—

Mr. REUSS. Defense cooperative programs aren't in these figures at all, are they?

Dr. HORNIG. I think the best way to answer your question is to refer to Mr. Zwick's table. I think that purely research expenditures which was that of the National Institutes of Health has in most of the Western countries and the advanced countries gone down.

I think I should have limited my statement to that case.

Mr. REUSS. Dr. Hornig, is it or is it not a fact that from 1962 to 1966, total dollar cost of research expenditures has gone up from \$23.7 million to \$28.5 million?

Dr. HORNIG. I am afraid I don't have that particular figure with me, Mr. Chairman.

Mr. REUSS. Well, if you find that my assertion that that is the case is in fact invalid, would you file something in the record for us, because our figures were developed from the administration's own figures. Let me ask Mr. Trued and Mr. Zwick if I have misreported any—

Mr. ZWICK. Mr. Chairman, I do not have that particular set of numbers either. The problem, of course, is research and exploratory development as compared to research and applied research. Do you include—have you taken out of that the NASA tracking facilities—

Mr. REUSS. Yes.

Mr. ZWICK (continuing). Or not.

Mr. REUSS. Yes, I did. Because that, of course—

Mr. ZWICK. The numbers sort of move around.

Mr. REUSS. But is it not a fact that plain ordinary research in the common acceptance of the term which is costing dollars and taking a bite out of our balance of payments has gone up from \$23.7 million in fiscal year 1962 to \$28.5 million in the current fiscal year.

Mr. ZWICK. Mr. Chairman, as I said, I do not know the data that went into that series. I think the best estimate of what has happened to research is the one I submitted on page 6 of my statement which tries to net out—

Mr. REUSS. That table begins in 1964, though.

Mr. ZWICK. Yes.

Mr. REUSS. But we are interested in what has happened from the time when we first realized that we were in a balance-of-payments bind.

Mr. BROWN. Mr. Chairman, would you clarify one thing for me. Where are you getting your figures from?

What source of material? Do we have that material in front of us and what was the reference by Dr. Hornig to Mr. Zwick's table?

Dr. HORNIG. Yes.

Mr. REUSS. Our figures are obtained from the four agencies involved, the Department of Defense, the Department of Health, Education, and Welfare, the National Science Foundation, and the Atomic Energy Commission.

And these figures were all obtained from the statements of those agencies when they appeared before us on February 10.

Mr. ZWICK. Well, Mr. Chairman, I would—

Mr. REUSS. This is a rather serious matter because if you, who are the guardians of the balance of payments, think that our expenditures for foreign research are going down when in fact they are going up, then we need to have the President's Cabinet Committee consider this.

Mr. ZWICK. Mr. Chairman, in our table, our best netting out would have shown that they are not going down but remaining constant.

Mr. REUSS. As of 1964.

Mr. ZWICK. Yes, sir.

Mr. REUSS. Yes, but what concerns us is that if you take the time when our balance of payments first became generally recognized as critical, foreign research expenditures have gone up. And since this goes on year after year, the question is, How does this compare with Cabinet Committee efforts to correct our balance-of-payments situation in other fields?

Mr. ZWICK. Mr. Chairman, the only way to get at that question is through a detailed look at the composition of the research. I am not in a position to comment on why it jumped between 1963 and 1964.

Mr. REUSS. In order that the record may be clear on this point, I will supply you with the table which the staff made from the testimony of the four agencies concerned, and if you find my assertion that expenditures of dollar impact on our balance of payments for the four research programs which we are concerned with here have not gone up from \$23.7 to \$28.5 million from fiscal 1962 to fiscal 1966, I wish you would correct the record at that point.

Mr. ZWICK. I will be happy to.

(The information referred to is as follows:)

We agree that the total amount for foreign research for the four agencies have risen from about \$23 to \$28 million in the period from 1962 to 1966. However, if it had not been for a buildup of DOD project-type research in southeast Asia and Latin America for special defense needs, the total amounts for both years—1962 and 1966—would be about the same.

We would note, further, that the amounts for Department of Health, Education and Welfare and National Science Foundation covered by ceilings established by the Bureau of the Budget and for the Department of Defense covered by agreed on restrictive targets have declined from a level of \$21 million in 1963 to a level of \$15 million currently estimated for 1966.

Dr. HORNIG. Mr. Chairman, may I simply add here that, as Mr. Zwick has indicated, to comment on your statement does require detailed analysis of the figures. However, this period from 1962 to 1966 has been a period, of course, when our scientific efforts in total have been expanding very considerably.

Mr. REUSS. I didn't quite hear.

Dr. HORNIG. What I am saying is the proportionate expenditures abroad have gone down because our own internal expenditures have risen. I think the real question is not the absolute figures but whether the money has been prudently spent in the American interest and this

it seems to me—because the balance of payments is one of several very important considerations.

Mr. REUSS. Surely. Now, let me go into the criteria for balance-of-payments expenditures on governmental research abroad.

Mr. TRUED, I have the impression that the President's Cabinet Committee on Balance of Payments has never issued a document or directive on foreign research expenditures and their balance-of-payments impact, is that correct?

Mr. TRUED. That is correct, Mr. Chairman. I would like—could I just supplement that with just one remark, Mr. Chairman—

Mr. REUSS. Yes.

Mr. TRUED (continuing). So that the broad outlines of the workings of the Cabinet Committee are evident to all members of the committee.

The Cabinet Committee and the Executive Committee which I have the privilege to chair, working as its working group, seeks to define the problem in terms of the likely magnitude and significance of a deficit on balance-of-payments account. Taking this into account, it then determines on a broad basis what the general types of measures ought to be employed in bringing this into a sustainable position so that it is a sense of urgency it conveys to the operating agencies after approval by the President of its recommendations.

It does not in a sense get down into all the details of the program. Certainly it develops programs and makes particular agencies or persons responsible for carrying out the necessary curtailment of expenditures that have been decided upon, and it depends upon the gold budget as its key insight into the trend of what is happening on Government account.

These quarterly reports furnish the basis for the gold budget which the Bureau of the Budget puts together, and the Cabinet Committee then has it as an indicator of whether the thrust of policy is being carried out on the balance-of-payments front with reasonable or needed success. What I just want to make clear, Mr. Chairman, is that the Cabinet Committee deals with broad policy. It does not get into all the details of the operations of the programs which are the responsibility of particular individuals or agencies of Government.

Mr. REUSS. Your answer, then, is that the President's Cabinet Committee on Balance of Payments has never issued any directive specifically with reference to foreign research.

Mr. TRUED. That is correct, sir.

Mr. REUSS. Now let's turn to the Budget Bureau. You, Mr. Zwick, referred to Budget Bureau Circular A-58 of July 7, 1964, as the relevant document for cutting down on all matters, including foreign research. That document does not mention, specifically, foreign research, at all, does it?

Mr. ZWICK. Mr. Chairman, you are correct. That document, of course, was supplemented by letters from the Directors to the individual agencies where research was a major item and we have provided the committee with copies of those letters.

Mr. REUSS. Yes, but as far as the research people are concerned, the President's Cabinet Committee has told them nothing specific about research, and all that Budget Circular A-58 has told them is cut down as much as possible, in general terms. Isn't that about it?

Mr. ZWICK. No, Mr. Chairman. I think I would not characterize our system that way. As I said in my summary testimony, the Budget Bureau operates through general statements about policy, A-58 in this case. It then supplements those general statements with specific letters to the heads of the major agencies spending on research and development overseas. These letters provide guidance not only to the agencies but to the Bureau's examiners who are in continuous, almost daily contact with the agencies, and it is through this latter process, the continuous daily contact of our examiners with the agencies, and periodic reviews that we exercise our responsibility. I don't believe it is proper to characterize our responsibilities as being fulfilled when we issue a circular like A-58.

Mr. REUSS. What I am trying to get at is what directions the science people have received in writing from up above. We have established that from the President's Cabinet Committee they haven't received any. From the Bureau of the Budget, which, of course, is a member of the President's Cabinet Committee, they have received Circular A-58 of July 7, 1964, which you concede does not say anything specific about research expenditures. But then you tell me that this has been supplemented by various written letters and memorandums which do set forth criteria. Would you now file with the committee those letters and memorandums so that we can take a look at what they said. Do you have them with you?

Mr. ZWICK. Yes. I filed those yesterday with you.

Mr. REUSS. Yes. I think the record should indicate at this point what those communications are. I just want to check with you, Mr. Zwick, that the letters which you supplied us are the same ones that you are talking about.

I have a letter from the Bureau of the Budget dated May 29, 1963, to the National Science Foundation.

Mr. ZWICK. Yes.

Mr. REUSS. A letter from the Bureau of the Budget dated August 2, 1963, to the National Science Foundation. A letter from the Bureau of the Budget dated October 22, 1963, to the National Science Foundation. And a letter from the Bureau of the Budget dated September 19, 1964, to the National Science Foundation.

(The letters referred to are as follows:)

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., May 29, 1963.

HON. ALAN T. WATERMAN,
Director, National Science Foundation,
Washington, D.C.

DEAR DR. WATERMAN: As you know, the President has been giving careful attention to all possibilities for reducing the deficit in our balance of international payments. Federal dollar support of foreign scientists abroad has been identified as one area for savings, particularly in developed nations financially able to support their own investigators. You will recall that the International Science Committee of the President's Science Advisory Committee issued a report last fall suggesting that in some countries in Europe the situation may have reached the point at which some U.S. overseas research support programs should begin to be phased out.

The National Science Foundation is now financing a number of research projects in developed countries. We believe that the Foundation should take steps to curtail this support and, in particular, give increased attention to encouraging the substitution of local funds for dollar support in research programs overseas.

While we have identified in this letter only the support of research overseas as an area for dollar savings, consideration should be given to reducing other related activities, particularly in developed countries.

In order to achieve reductions in our programs abroad in a manner which will permit maximum flexibility in reprogramming and reflect research priorities, we propose that limitations on the level of dollar support of overseas research be observed by all agencies involved. In the case of NSF, we ask that the 1964 obligations for research project grants awarded to foreign institutions in Western Europe, Canada, Australia, and New Zealand, should not exceed \$750,000; however, if equipment is to be purchased under any of these grants, it should be procured from U.S. sources within this overall ceiling.

In order to minimize the adverse reaction of the governments and scientific communities of the foreign countries involved, we urge that the agencies take steps to explain carefully the reasons lying behind the reduction in U.S. support of research overseas. Although consideration was given to a more abrupt termination of overseas research support, a gradual reduction, as outlined above, was decided upon. While this does not improve the U.S. balance of payments to the same extent as complete termination, it does permit some flexibility in providing for existing commitments and in continuing high priority research projects.

The Department of State has been asked to work with you in dealing with foreign governments to explain need for the reductions in U.S. support of research overseas.

Your 1964 program should be planned so as to avoid long-range commitments and to maximize reductions in the level of U.S. overseas research support for the fiscal year 1965 and future years.

Sincerely,

KERMIT GORDON, *Director.*

EXECUTIVE OFFICE OF THE PRESIDENT,

BUREAU OF THE BUDGET,
Washington, D.C., August 2, 1963.

DR. LELAND J. HAWORTH,
Director, National Science Foundation,
Washington, D.C.

DEAR DR. HAWORTH: Federal agencies can look with some satisfaction on the results they have obtained to date in reducing the adverse impact of their operations abroad upon the U.S. balance of payments. The President has given recognition to these results in his special message on the balance of payments, and he has directed that we intensify our efforts and achieve further savings over the next 2 years. Accordingly, we must take additional steps to pare the overseas expenditures of the Federal Government to the absolute minimum. We must proceed on the premise that no saving is too small to be pursued and realized; I urge your continued cooperation toward that end.

It is in this respect that we have conducted the review of your report on offices and missions abroad (Bulletin 63-13) and your quarterly submission under Bureau of the Budget Circular No. A-58. We are gratified to note that the Foundation's 1964 research grant obligations in Western Europe, Canada, and New Zealand fall considerably under the \$750,000 ceiling requested by the Bureau.

In addition to the actions which you have proposed in your review and quarterly submissions, we believe the seriousness of the balance-of-payments problem requires that the following actions be taken promptly by your agency:

1. That the additional position proposed for the Paris office not be established.
2. That the Paris and Tokyo offices each be reduced by one presently established position.

3. That a reduction of \$37,000 be made in expenditures entering into the balance of payments for construction of the Chilean Observatory.

To reflect the results of these actions, we are including revised targets and estimates for your agency in the report to the President, as follows:

[In thousands of dollars]

	Fiscal year 1964 target	Fiscal year 1965 estimate
Payments.....	4,510	5,000

Our review also suggests the following possibility of still further savings which has not been reflected in revisions of the targets. It is requested that you give immediate consideration to this possibility and that you notify me of your conclusions and of the actions taken on this matter :

Prohibitions against use of predoctoral fellowships for study abroad.

I count on your personal attention in seeing that your agency does the utmost to meet the goals which the President has set for reducing Federal expenditures abroad.

Sincerely,

KERMIT GORDON, *Director.*

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., October 22, 1963.

HON. LELAND J. HAWORTH,
Director, National Science Foundation,
Washington, D.C.

DEAR DR. HAWORTH: In my letter of May 29, 1963, concerning reductions in overseas research supported by your agency, it was stated that if equipment is to be purchased under any of these grants, it should be procured from U.S. sources. Since grant amounts for fiscal year 1964 have been established in many cases, and to simplify administrative procedures, the policy in the May 29, 1963, letter is modified as follows: Any piece of equipment costing over \$2,000 in U.S. dollars should be procured from U.S. sources within any overall dollar ceiling previously established for your agency.

It is expected that your agency will take all possible steps to make U.S. manufactured equipment available at lowest cost to the foreign grant recipient. One such method might be to supply the grantee with the more expensive pieces of equipment, purchased at Government discount, and adjusting the grant accordingly.

Your continued efforts to encourage foreign support of research by their citizens are appreciated and are a necessary part of efforts to improve the U.S. balance of payments.

Sincerely,

KERMIT GORDON, *Director.*

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., September 19, 1964.

HON. LELAND J. HAWORTH,
Director, National Science Foundation,
Washington, D.C.

DEAR DR. HAWORTH: In continuation of our efforts to reduce the deficit in our balance of international payments, I am writing to ask that limitations placed on the support of overseas research by the National Science Foundation in fiscal year 1964 be continued during fiscal year 1965.

Specifically, I ask that 1965 obligations for research project grants awarded to foreign institutions in Western Europe, Canada, Australia, and New Zealand, should not exceed \$750,000 and that if equipment is to be purchased under any of these grants, it should be procured from U.S. sources within this overall ceiling. I also ask that you continue your efforts to reduce overseas research support wherever reasonable and that you avoid long-range commitments to provide such support.

Sincerely,

KERMIT GORDON, *Director.*

Mr. ZWICK. That is correct.

Mr. REUSS. That is four documents. Does that represent the totality of written communications from the Bureau of the Budget to the National Science Foundation on criteria which are to govern our science grants abroad?

Mr. ZWICK. I believe that does represent the totality for criteria related to science grants. The question now that we must address is

whether in other letters with regard to the gold budget procedures generally science was raised.

For example, yesterday, in providing these letters to your staff, we did not provide one letter that they requested and we found after searching it down, that it was concerned with fellowships, and so we found it in another file. So that there is a question of defining science grants versus total activities that are related to science overseas. But I think as you stated it, this is the totality of our letters to the National Science Foundation.

Mr. REUSS. Yes. Those that have to do with——

Mr. ZWICK. Scientific——

Mr. REUSS (continuing). Ceilings and general matters do not contain criteria as such, as the letters you handed us.

Mr. ZWICK. Right.

Mr. REUSS. Then I want to go over the letters from the Bureau of the Budget to NIH or HEW. I have a letter from the Bureau of the Budget dated May 29, 1963, to the Secretary of Health, Education, and Welfare, a letter from the Bureau of the Budget dated May 4, 1963, to the Secretary of Health, Education, and Welfare, and a letter from the Bureau of the Budget dated June 11, 1965, to the Secretary of Health, Education, and Welfare. Does that represent the three written documents.

Mr. ZWICK. Yes.

(The letters referred to are as follows:)

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., May 4, 1963.

HON. ANTHONY J. CELEBREZZE,
Secretary, Department of Health, Education, and Welfare,
Washington, D.C.

DEAR MR. SECRETARY: As you are aware, we are taking a very hard look at the Federal segment of our international balance of payments with special emphasis on all actions that might offer promise of lessening our current adverse balance. A review has been completed of the material required by Bureau of the Budget Circular No. A-58 submitted by your Department on "International Transactions of the Federal Government." The justification provided with your submission contained a description of the activities that produce overseas expenditures and receipts but omitted an identification of administrative actions being taken by the Department to meet this problem.

The quarterly budgets for international transactions are meant to be much more than the preparation of an estimate or a review of statistics. The quarterly budget system is intended to bring about specific improvements in our balance-of-payments situation. Our instructions (Circular No. A-58) included such points as the following:

"The head of each agency will be responsible for taking all possible steps for his agency to minimize payments and maximize receipts entering into the balance of payments * * *.

"Each agency will review its requirements for conducting activities abroad, with a view to terminating these activities, consolidating them, or restricting their scope, wherever this can be done without damage to the national interest * * *.

"Each agency head will see that the system of estimates, reports, and controls prescribed herein is an essential part of his system of management * * *.

"* * * It should be noted that the estimate required are not intended to be forecasts or projections of what will happen if present practices continue. Instead, the estimates are to be plans of what the agency head will attempt to bring about by changing present practices in accordance with Government policy where necessary."

The Department of Health, Education, and Welfare estimates that it will make foreign payments in the amount of \$121,369,000 in fiscal year 1963. This

amount is a significant portion of total Federal foreign payments. While I am aware that the Department is not able to affect administratively a sizable portion of these payments, I urge that you carefully review all areas in which you have discretion. A close examination should be made of balance-of-payments implications of your fiscal year 1964 program before submission of the June 15 international transactions report. We will continue to require justifications, detailing quarterly as well as annual changes in the Department's payments and receipts, and urge that your next report describe the administrative actions you are taking, or contemplate taking, to reduce the balance-of-payments deficit.

I am writing you a separate letter concerning research grants to foreign investigators. In this connection, to facilitate our review under the circular, it will be helpful if you would separately identify foreign research expenditures. Accordingly, it is asked that your future submissions provide a separate "break-out" of the National Institutes of Health transactions and those of other constituents which are conducting foreign research not financed by excess foreign currencies. This latter requirement will be terminated as soon as possible.

Sincerely,

KERMIT GORDON, *Director.*

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., May 29, 1963.

Hon. ANTHONY J. CELEBREZZE,
Secretary of Health, Education, and Welfare,
Washington, D.C.

DEAR MR. SECRETARY: As I stated in my May 4, 1963, letter, the President has been giving careful attention to all possibilities for reducing the deficit in our balance of international payments. Federal dollar support of foreign scientists abroad has been identified as one area for savings, particularly in developed nations financially able to support their own investigators. In this connection, the International Science Committee to the President's Science Advisory Committee issued a report last fall suggesting that in some countries in Europe the situation may have reached the point at which some U.S. overseas research support programs should begin to be phased out.

In your Department all dollar support of foreign scientists abroad now comes from the National Institutes of Health. While we know that steps have already been taken to curtail this support, we urge the Department to continue its efforts to make further reductions and, in particular, give increased attention to encouraging the substitution of local funds for dollar support in research programs overseas.

While we have identified in this letter only the support of research overseas as an area for dollar savings, consideration should be given to reducing other related activities, particularly in developed countries.

In order to achieve reductions in our programs abroad in a manner which will permit maximum flexibility in reprogramming and reflect research priorities, we propose that limitations on the level of dollar support of overseas research be observed by all agencies involved. We do not disagree with the limitation of \$15 million in dollar payments which, according to your letter of May 17, 1963, you agree to impose on fiscal year 1964 obligations for all overseas research support by NIH including support of international organizations; however, we ask particularly that the 1964 obligations for research project grants awarded to foreign institutions in Western Europe, Canada, Australia, and New Zealand not exceed \$8.5 million. If equipment is to be purchased under any of these grants, it should be procured from U.S. sources within this overall ceiling.

In order to minimize the adverse reaction of the governments and scientific communities of the foreign countries involved, we urge that the agencies take steps to explain carefully the reasons lying behind the reduction in U.S. support of research overseas. Although consideration was given to a more abrupt termination of overseas research support, a more gradual reduction, as outlined above, was decided upon. While this does not improve the U.S. balance of payments to the same extent as complete termination, it does permit some flexibility in providing for existing commitments and in continuing high priority research projects.

The Department of State has been asked to work with you in dealing with foreign governments to explain the need for reductions in the U.S. support of research overseas.

Your 1964 program should be planned so as to avoid long-range commitments and to maximize reductions in the level of U.S. overseas research support for the fiscal year 1965 and future years.

Sincerely,

KERMIT GORDON, *Director.*

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., June 11, 1965.

HON. ANTHONY J. CELEBREZZE,
Secretary of Health, Education, and Welfare,
Washington, D.C.

DEAR MR. SECRETARY: We have completed our analyses of the Department's report on the international transactions conducted by your Department which affect the balance of payments.

Your April 7, 1965, report indicates your Department's awareness of the seriousness of the balance-of-payments problems and the need for voluntary efforts to minimize the impact of the Department's programs. We believe the actions undertaken to date which are indicated in your letter are desirable and should be pursued. In addition wherever possible I urge you to initiate further actions which will tend to reduce the impact of your Department's program. With this in mind, the following targets have been established for your Department.

[In thousands of dollars]

	Fiscal year 1966	Fiscal year 1967
Total payments affecting the balance of payments.....	153, 283	166, 573

The above targets are as requested by the Department with the single exception that the increase of \$450,000 for fiscal year 1967 in the programs of Public Health Service has not been included. We understand that the increase was intended primarily for the programs of the Institute of Child Health and Human Development and the Institute of Mental Health. These are high priority programs and do merit some increases. However, we believe that these new programs should be offset by decreases in the programs of the other institutes. The amount of Public Health Service research grants to foreign institutions and international organizations which affect the balance of payments should, therefore, remain at the approved 1966 level of \$9.5 million.

Sincerely,

CHARLES L. SCHULTZE, *Assistant Director.*

MR. REUSS. Then I have a letter dated August 15, 1963, from the Bureau of the Budget to the Department of Defense. So far as I know, that is the only Bureau of the Budget document on this subject sent to the Department of Defense over the years. Is that correct?

MR. ZWICK. Mr. Chairman, that is not correct. I submitted yesterday three letters: One dated May 29, 1963, to Mr. McNamara from Director Gordon; one dated August 15, 1963, the one you referred to; one dated August 2, 1963.

MR. REUSS. My staff tells me that they don't seem to have those two. Do you have extra copies of them now?

MR. ZWICK. I have one set which I can provide now or if we are going to go into the details of these—

MR. REUSS. You only have one set for yourself?

MR. ZWICK. Yes.

MR. REUSS. Well, since we apparently didn't get any letters other than the one of August 15, 1963, would you see that we are supplied copies of the other two you mention.

(The letters referred to are as follows:)

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., May 29, 1963.

HON. ROBERT S. MCNAMARA,
Secretary of Defense,
Washington, D.C.

DEAR MR. SECRETARY: As a part of the Government-wide efforts to reduce the dollar outflow, we are requesting all agencies with significant programs in support of research abroad to curtail these activities in Western Europe, Canada, Australia, and New Zealand. The other agencies principally involved are the Department of Health, Education, and Welfare and the National Science Foundation, and restrictive policies are being applied to the programs of these agencies.

We are aware of the effort that you have undertaken in the Department of Defense to achieve further substantial economies in overseas operations. In this connection, it is requested that particular attention be given to Defense-sponsored research programs abroad in the review and report to the President which you are planning to complete before July 1 of this year. We would expect that the actions taken by your Department would result in a 50-percent reduction in obligational activity below the fiscal year 1963 levels in support of research in the areas mentioned above.

In order to minimize the adverse reaction of the governments and scientific communities of the foreign countries involved, we urged that the agencies take steps to explain carefully the reasons lying behind the reduction in U.S. support of research overseas. Although consideration was given to a more abrupt termination of overseas research support, a more gradual reduction, as outlined above, was decided upon. While this does not improve the U.S. balance of payments to the same extent as complete termination, it does permit some flexibility in providing for existing commitments and in continuing high priority research projects.

The Department of State has been asked to work with you in dealing with foreign governments to explain the need for reductions in the U.S. support of research overseas.

Your efforts and leadership in the solution of this very important and difficult problem are greatly appreciated.

Sincerely,

KERMIT GORDON, *Director.*

THE SECRETARY OF DEFENSE,
Washington, August 2, 1963.

HON. KERMIT GORDON,
Director, Bureau of the Budget.

DEAR KERMIT: In your letter of May 29, 1963, you requested that, as a part of the Government-wide efforts to reduce the adverse balance of payments, I consider Defense-sponsored research programs in Western Europe, Canada, Australia, and New Zealand with a view to reducing obligational activity by 50 percent below the fiscal year 1963 level in support of research in those areas. As agreed to by a member of your staff, Defense-sponsored research to be included in our review has been defined to be basic and applied research as included in budget submissions.

Restrictions on obligations for procurement of defense research and development outside the United States, which have been in effect since August 15, 1962, provide that obligations are to be held to an absolute minimum and may be made only in the following cases: (1) obligations to foreign sources pursuant to a treaty or executive agreement between governments, (2) obligations which are estimated not to exceed \$1,000, and (3) obligations which are made to meet requirements concerning which it is determined in advance that they cannot be met from domestic sources. Further, before making such determinations the approving authority is required to explore fully the feasibility of meeting the requirement under a cost-sharing arrangement or on a complementarity-barter basis.

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My review of this matter indicates that fiscal year 1963 obligations for the above-defined Defense-sponsored research in the areas mentioned were as follows :

	<i>Thousands</i>
Western Europe-----	\$4, 222
Canada-----	822
Australia-----	383
New Zealand-----	67
Total-----	5, 494

It has been standard practice for the military departments to enter into tacit understandings that if research is satisfactory, contracts will be continued for a 3-year period, subject to availability of funds. A reduction of 50 percent in fiscal year 1964 obligations would require withdrawal from roughly one-third of these understandings and/or prohibit any new research support activity. On the other hand, a phased reduction in obligational activity may be able to be absorbed, and at the same time permit us to honor existing understandings and fund a minimum of new high-priority projects, while a comprehensive reassessment of priorities of all research in these areas is underway. In addition, as a result of our recent discussions with Canadian officials, Canada is now exempt from the restriction on overseas research and development placed in effect last August, and thus a heavier cut in other areas will be required.

Therefore, I have requested the Director of Defense Research and Engineering to reevaluate the merits and potentialities of all Defense-sponsored research projects and programs in the areas mentioned in your letter with a view to curtailling the less essential programs. We have established as a target a reduction in obligational activity for these programs of 50 percent below the fiscal year 1963 level to be achieved by fiscal year 1966. Targets for fiscal year 1964 and fiscal year 1965 have been established at 80 and 65 percent respectively of the fiscal year 1963 level, with exceptions to be examined on a case-by-case basis.

Sincerely,

ROSWELL L. GILPATRIC,
Deputy Secretary of Defense.

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., August 15, 1963.

Memorandum for: Mr. Charles J. Hitch, Assistant Secretary of Defense
(Comptroller).

Subject: Review of balance-of-payments impact of overseas research and development activities.

We understand that the special review leading to Secretary McNamara's memorandum to the President of July 16, 1963, did not specifically address themselves to the entire range of overseas research and development activities. Since the special review of overseas research activities covered in Mr. Gilpatric's letter of August 2, 1963, was restricted to the "research" category as currently defined in budget estimates, the result, as we understand it, has been that overseas research and development projects in the "exploratory development" category—some of which are quite similar to applied research projects in the "research" category—have not yet been subjected to special review to the same degree as other areas.

While it is recognized that the restrictive policies and special approval procedures established in the Secretary's memorandum of August 15, 1962, apply to this area, we believe it desirable to attempt to achieve special reductions in overseas "exploratory development" on the same basis as have now been applied to overseas "research." The additional savings that prove to be possible in this area should be reflected in future reports under Budget Circular A-58.

ELLIS H. VEATCH,
Chief, Military Division.

Mr. ZWICK. Yes; we certainly will.

Mr. REUSS. And have we now covered all letters or documents sent by the Bureau of the Budget to departments and agencies concerning foreign research and its balance-of-payments impact?

Mr. ZWICK. Yes, Mr. Chairman, subject to the disclaimer I made earlier that other letters on gold budget procedures might have referred to research and we did not go back and pull all letters to the Department of Defense on gold budget matters and go through them and see whether there was any reference to research. But these are indeed the three letters that were directly concerned with the research and development component of Defense.

Mr. REUSS. And are you under the impression that from these letters to which we now refer, and which without objection will be made part of the record, that the Bureau of the Budget has set forth criteria for foreign research grants having a balance-of-payments impact?

Mr. ZWICK. I would repeat my earlier statement, that these letters in conjunction with the continuous interaction that we have with the agencies do provide the guidance. Now, we do have, as I mentioned, an interagency task force reviewing the gold budget procedures. This is not reviewed simply by the Bureau of the Budget which issues directions. We involve the agencies in the review process itself, so that this adds to the communications simply in this interagency task force environment, and secondly, and probably most importantly, though, I would like to stress that the guidance is given by the examiners in their continuous interaction with the agencies.

This is our major method for providing guidance through the examiners' contact.

We have, for example, now an informal agreement with National Science Foundation to hold under the \$750,000 ceiling that they have been given and they have indeed held under that ceiling. So that these written documents have to be supplemented by the continuous interaction within the executive branch.

Mr. REUSS. I am a little confused by your word "interaction." If a guideline or criterion is not in these letters it can't really be said to exist, can it?

Mr. ZWICK. I am not a lawyer but I would have thought that the answer to that would be "No," that we do have an agreement with the National Science Foundation to in fact come in at a lower level than the \$750,000 and that guideline does exist.

Mr. REUSS. Yes; but that has nothing to do with criteria. We are talking about criteria.

Mr. ZWICK. All right. Fine.

Mr. REUSS. A ceiling is of no use if within that ceiling projects are handed out without comparing them with criteria. You will admit, will you not, that criteria have to be written down someplace. They can't be metaphysical.

Mr. ZWICK. I would say that they have to be clearly understood between the two parties.

Mr. REUSS. Well, I will now ask you to call to the subcommittee's attention for the record any and all statements of criteria for foreign research projects contained in the various letters which you have forwarded to us and which we have been discussing. And if any criteria are not in letters, but if they occur as a result of something else, what is that something else? Was it a conversation between people? If so, between whom? When did it take place? Was any memorandum made of it?

What I am trying to do here is to go from the general to the particular. We have said that the President's Cabinet Committee as such hasn't given any guidance.

Now, we want to find out what guidance the Budget Bureau has given. We have said that your Circular A-58 of July 7, 1964, gave no specific instruction on research, but you then said that in these 10 letters, there has been some guidance. You have also said that there has been some other kind of guidance not put down on a piece of paper. So I would like you to tell us, first, what guidance there is in these letters, pointing to the specific language of the letters, and secondly, what guidance occurred by verbal or other written communications.

Mr. ZWICK. Mr. Chairman, with regard to the letters, I do not think I can, without reading the details, say that there are no specific criteria there. But I suspect that you will find little there. These refer to ceilings or reductions in levels. The basic criteria are the ones that were referred to by Dr. Hornig in his testimony.

Mr. REUSS. We will come to that in a minute. I just want to follow it down from the top.

Mr. ZWICK. Yes. I would like to make the point here, though, that in evaluating research activity, both overseas and domestically, when we do our budget review, we depend very heavily on the Office of Science and Technology to provide us with technical competence in this area. So that our first effort would be to depend on OST and its panels to provide us with criteria.

With regard to your specific question, I cannot answer it immediately. I suspect it is true that there is very little in the way of specific criteria in those letters. They were addressed mainly to ceilings. The details of how you meet this ceiling was something that we would normally—

Mr. REUSS. My impression from reading the letters is that they do not contain any guidelines or criteria, and that is where we seem to be at this point in the record. If you discover in those letters any specific guidelines or criteria by the Bureau of the Budget, I wish you would call them by subsequent statement to the subcommittee's attention.

Mr. ZWICK. Yes.

Mr. REUSS. Now, what about this other rather hazy area of oral criteria and guidelines? Who issued them, to whom, when, where, and what memorandums or scraps of paper were made of such conversations?

If the answer is "No," I will just have to assume that there aren't any such guidelines.

Mr. ZWICK. I am sorry, the answer is "No" to what?

Mr. REUSS. To my question. You have indicated that while your letters don't contain guidelines, there may have been oral guidelines issued by the Bureau of the Budget to one of these agencies. And without commenting on the propriety of that way of doing business, we would like to know for the record just what these oral guidelines were, who issued them, when, where, to whom, and how the oral guidelines were recorded.

Mr. ZWICK. Well, of course, let me start by repeating my earlier statement, that the main impact of Bureau of the Budget supervision comes through the contact of the examiners. These people are meeting continuously with the agencies in this particular area. They

work very closely again with Dr. Hornig's staff to implement them. The broad criteria, I believe, were stated in Dr. Hornig's testimony. They have to be—the research has to be above-average quality. It has to have relevance to the mission, direct mission relevance. To the extent that there are sharing agreements between our grant agencies and foreign countries, every effort should be made to increase the amount of foreign contribution. To the extent that equipment is required for this research it should be procured in the United States and specific limitations on overhead charges that will be covered.

Now, these are still very broad criteria and they must be then translated into the specifics of NIH's situation or NSF's or DOD's.

Mr. REUSS. Well, those aren't research criteria at all. They are the regular Bureau of the Budget procurement criteria, aren't they?

Mr. ZWICK. They have been issued specifically with regard to research.

Mr. REUSS. You are talking about the August 1964 policy document of the Federal Council for Science and Technology, are you not?

Mr. ZWICK. Yes. That is where——

Mr. REUSS. We are going to come to that but that isn't a Bureau of the Budget document.

Mr. ZWICK. It's in the sense that this is the guideline that the Bureau uses in exercising its responsibility. It was not promulgated by the Bureau of the Budget.

Mr. REUSS. What I am trying to do is identify all of the pieces of paper on which people from the President down have laid down guidelines for the granting of foreign research projects having a dollar impact, and let me——

Mr. ZWICK. Yes.

Mr. REUSS. Let me review the matter as it now stands. From the President, nothing. From the President's Cabinet Committee, nothing. From the Bureau of the Budget, the July 7, 1964, circular which, however, does not mention research.

Mr. ZWICK. But research is included, certainly.

Mr. REUSS. Yes; but not by name.

Mr. ZWICK. Not by name.

Mr. REUSS. And in addition to that, there have been various letters which have now been identified and made part of this record from the Bureau of the Budget to the various agencies, but so far as you know, those letters do not lay down any specific guidelines for foreign research expenditures.

Mr. ZWICK. In terms of written material, I accept that conclusion. I think you used the term "hazy," in referring to the oral description, and I was objecting to the word "hazy" as a description of the process by which the Bureau implements these policies.

Mr. REUSS. Well, I am a little disturbed about these oral guidelines because somebody must have told these various examiners something, I am anxious to know who told them; what, when, and where these oral guidelines came into effect; and what they are.

Do you think it is good budget practice to have this kind of oral guideline?

Mr. ZWICK. The detailed review of a particular budget must, I believe, be an oral process. We set ceilings. We have criteria laid down both in the gold budget proceedings and from Dr. Hornig's

staff with regard to this. The details of how you sort through the research program is something that I would question can be put down in a document.

Mr. ST GERMAIN. Excuse me, Mr. Chairman. If I might address this question, wouldn't it make a whole lot more sense, instead of using a ceiling to say that there shall be no research grants abroad unless justified, unless it is demonstrated that these cannot be accomplished here in the United States, unless it is demonstrated that these are absolutely necessary to the welfare and future of this country. Then, forget a ceiling.

Why give them a ceiling because they are going to go right up to that ceiling? Why have a ceiling? Just say none will be approved unless justified and demonstrated that they are absolutely essential and necessary, and then you wouldn't have this problem about all of the discussions of a budget, would you?

Mr. ZWICK. Let me comment that I think our current policy gives effect to the statements you have made. But we do believe that you will end up with essential research. I would like Dr. Hornig actually to address himself to that.

Mr. ST GERMAIN. Where does that ceiling come in, then?

Mr. ZWICK. The ceiling is a forecast.

Mr. ST GERMAIN. Say they shall be done. Then—just say they shall not be done unless they are demonstrated to be absolutely necessary.

Mr. ZWICK. Well, the ceiling is the same sort of requirement as the \$500 million contingency allowance that we put in fiscal year 1967 budget. We know that there will be additional pieces of legislation coming in. We cannot specify them in detail when we put the budget together but we know that there are going to be some additional costs. In the interests of good bookkeeping, you make your best estimates of what will in fact transpire during fiscal 1967 and you put a contingency allowance in. I think it would be a mistake to say that we expect no foreign research in fiscal 1967, and therefore, we will put a zero in and then ex post, have expenditures on research.

There is a requirement to forecast as best one can what the actual result will be when we look at fiscal 1967 after it has been concluded, and that is what the ceiling represents, a forecast of what the detailed review will in fact produce, and in the interests of good budgeting, I think it is essential.

Mr. ST GERMAIN. You are forecasting before you make a review.

Mr. ZWICK. That is correct.

Mr. ST GERMAIN. You are presupposing once you make a review these things are going—

Mr. ZWICK. We are presupposing—

Mr. ST GERMAIN. Those people submitting these programs say to them, well—they are presupposing and forecasting in this manner.

Mr. REUSS. I would like to get straight in my mind this oral interaction that occurs. I am thoroughly familiar with the notion that your budget examiners have to proceed orally. That is the only sensible way in which they can proceed. But in proceeding orally to make a review, they must have some written guideline against which they match given proposals and budgets, must they not? You don't mean to suggest that the criteria themselves are purely

oral, and that the examiners in addition to having them proceed orally have to rely on oral guidelines.

You aren't suggesting that that is the budget procedure are you?

Mr. ZWICK. No I am not. We start with the broad criteria as laid down and repeated here, for example: only if mission relevance can be stated and clearly shown, the absorptions of overhead costs—the things we have already gone through.

Now, an examiner must sit down with AEC and look at commitments, for example, the commitment to Japan with regard to studying the effects of the atomic blast and the aftereffects of this. There are certain fixed components. We are almost sure that we will continue this research. The Bureau has argued in the past that this particular activity should be cut down, but I don't think any one now argues that we should completely withdraw at this time from research in Japan on the impact of the atomic explosion.

There are certain things which I think fall out fairly quickly as efforts which all reasonable men would agree should be done.

This leaves you again with a smaller residual, and the question is, Have we set that residual tight enough?

I would insist that there should be a residual or we would be accused of improper budgeting.

And secondly, whether there is a process that properly weighs the alternatives and selects the appropriate projects. I would turn really to Dr. Hornig for that process.

Mr. REUSS. I am going to get to Dr. Hornig in just a minute but in order that our record may be clear, we do have to establish what are the criteria and guidelines from up above. And so to recapitulate, and please correct me if I am wrong, as to specific guidelines on foreign research spending, from the President, none; from the President's Cabinet Committee, none; from the Bureau of the Budget—

Mr. ZWICK. Ceilings. Dollar ceilings.

Mr. REUSS. Dollar ceilings but, as Congressman St Germain has pointed out, they contain no criteria. As far as criteria are concerned, which is the point at which this is directed, from the Bureau of the Budget, none. Is that correct?

Mr. ZWICK. Except these gold budget criteria which are much broader than research but which also apply to research. So I think it is incorrect to say "None." Research is part of the gold budget and therefore—

Mr. REUSS. That is Circular A-58, the July 7, 1964, memorandum.

Mr. ZWICK. That is right.

Mr. REUSS. But that applied to foreign expenditures generally and not specifically to research.

Mr. ZWICK. That is right but it therefore, I believe, follows that there are criteria for research.

Mr. REUSS. The Bureau of the Budget has never issued criteria along the lines described by the gentleman from Rhode Island, Mr. St Germain, or along some similar lines, such as no spending on foreign research unless it is established that the project is of primary importance, that it can't be competently accomplished in the United States, and that it can't be postponed. You don't have any criteria like that.

Mr. ZWICK. Mr. Chairman, I would state that I believe the criteria as exists in the gold budget policy do in fact give effect to these statements in different words. We state—

Mr. REUSS. Would you then accept what I have just said as the governmental criteria in effect? On foreign research?

Mr. ZWICK. Yes.

Mr. REUSS. I am delighted to hear that.

Mr. TRUED. Mr. Chairman, may I just interject one thought, because I would like to clarify in my own mind your statement that there is no guidance from the President or the Cabinet Committee with regard to these expenditures.

Mr. REUSS. I said criteria.

Mr. TRUED. Insofar as you mean criteria for specific research, that is true, but in terms of guidance, in terms of the balance-of-payments objective, where this fits into the whole pattern of spending abroad, there is certainly guidance in that sense, and I want to clarify that there is a sharp difference between setting up research criteria and guidance with with regard to the conduct of operations.

Mr. BROWN. Mr. Chairman, may I ask Mr. Zwick one question here? In your statement you say—

whenever payments exceed the target for the year or receipts are less than the target, the reason for the failure to achieve the target must be explained by the agency.

Now, in point of fact, with reference to research, do you have any examples of times when the agency has been required to explain failure to meet the targets established?

Mr. ZWICK. Mr. Brown, I have one specific. I must admit I joined the Budget Bureau on October 1 and the first question was why had NASA gone over their target, and we did in fact go into a detailed discussion of NASA's exceeding their target. That is one specific that I can refer to. I am sure—

Mr. BROWN. Was this also oral? Was there no written report?

Mr. ZWICK. I cannot answer that conclusively. I suspect it was oral but we may in fact have a memorandum between our examiner and NASA on that specific point. I would have to check.

Mr. BROWN. Now, with reference to ceilings, as noted in the table which I guess was prepared by the subcommittee—

Mr. REUSS. Yes.

Mr. BROWN. Bureau of the Budget Ceilings on Agency Expenditures for Foreign Research, 1962 to 1967. On occasion the expenditure for research in some specific department exceeded the ceiling by better than double in certain years, and on some occasions better than four times.

Mr. REUSS. Mr. Brown, may I interrupt at that point because I think the staff table may be misleading. If you are looking, as I think you probably are, at the Department of Defense expenditures—

Mr. BROWN. Right.

Mr. REUSS (continuing). The reason in justice why those expenditures exceed the ceiling so dramatically is, and this is explained in footnote A, the ceilings were just on expenditures in highly developed areas, Western Europe, Australia, and New Zealand. As expendi-

tures there went down somewhat, expenditures for dollars elsewhere went up and that explains it. The ceilings——

Mr. BROWN. Thank you.

Mr. REUSS (continuing). In short, leaked a good deal because they only covered part of the expenditure areas.

Mr. BROWN. Well, if, then, we consent that there have been other cases, however, where you have exceeded the ceiling, I would think that either your statement is incorrect in your former statement or we would have some examples of written reports or at least some memorandums on oral reports on the times when the target was exceeded.

Mr. ZWICK. I am sure that such exists.

Mr. BROWN. Would it be helpful for this committee to have some indication of these reports?

Mr. REUSS. Yes. Without objection they will be filed at this point. (The information referred to is as follows:)

The NASA target referred to in my testimony was the fiscal year 1965 target for the total gold budget expenditures. The target established for fiscal year 1965 was exceeded by \$900,000.

Within this total target, the estimate for overseas research grants and contracts was \$213,000. The actual gold budget expenditures for these activities was \$109,000—an underrun of \$104,000.

The total overtargget expenditures were caused entirely by tracking and data acquisition activities which are directly tied to flight missions. Therefore, correspondence between NASA and the Bureau of the Budget concerning the overtargget gold budget expenditures for fiscal year 1965 made no mention of overseas research grants and contracts.

Thus in further checking I find that neither in the case of NASA nor any other agency have there been instances where Bureau ceilings on research grants and contracts have been exceeded.

Mr. REUSS. Let me turn now to Dr. Hornig, to the Office of Science and Technology. We have said so far that the President, the President's Cabinet Committee, and the Bureau of the Budget have apparently never issued specific criteria. However, specific criteria were issued by the Federal Council for Science and Technology in their document of August 1964, which you have given to this subcommittee.

I would like to call your attention to the criterion which was set forth in the language of August 1964, by the Federal Council of Science and Technology. There the language said no projects may be undertaken except those, and I quote, "which cannot be carried out effectively in this country."

Now, that so far as it goes is a meaningful criterion. I notice, however, that 4 months later, in December 1964, those guidelines were amended in a very crucial particular. No longer were projects subject to veto because they could be carried out effectively in the United States, but instead, support is limited to projects "which can be carried out more effectively outside this country."

Now, in other words, a project which could be carried out with great effectiveness in the United States may add to the dollar drain simply because it can be carried out a little more effectively some other place. Why this backsliding?

Mr. ST GERMAIN. Mr. Chairman, if I might interject this, I would like somebody to tell me how you can really have judgment whether a matter can or cannot be carried out more effectively. Now, that is the joke of the century, that particular phrase.

Mr. REUSS. Well, could you explain the radical change in the policy guidelines?

Dr. HORNIG. I don't think it's a radical change.

But before I do, may I interject a couple of other points which relate to the previous conversation bringing us up to date.

Of course, I would like to emphasize that the Bureau of the Budget is responsible for dollar matters. We work closely with them, looking at the substance of the programs.

Now, as to whether pressure has been exerted, since our previous conversion I have looked a little further at the figures. When one looks at the net outflow, part of what we are talking about has been the great buildup in the NASA tracking and external facilities.

Mr. REUSS. Really, we should not go over that again because it has been pointed out they are not in the computation at all. We left that out both in 1962 and 1966.

Dr. HORNIG. In the figures I have here, the Department of Defense, research and exploratory development figures dropped from \$8.7 million in 1963 to \$5 million in 1966. This is as opposed to specific development projects which are carried out jointly, such as the V/STOL aircraft and so forth. But these are the categories, research and exploratory development.

Also the figures I have here for NIH in Western Europe, the peak year was in 1963, \$26.5 million was spent, which by 1965 had dropped to \$4.63 million.

So that in the categories, according to my figures, of these two main contributors, in the categories of research, they have been under substantial pressure to reduce their expenditures.

Now, to get back to your question—

Mr. REUSS. Before we leave this—do you differ with the figures compiled by the subcommittee, from the figures furnished us by the Department of Defense, HEW, the National Science Foundation, and the Atomic Energy Commission, which indicated that the total expenditures of the four agencies for foreign research with dollar impact, increased from \$23.7 million in 1962 to \$28.5 million in 1966?

Dr. HORNIG. Mr. Chairman, I don't have the figures. One must break them down by category. I would have to study them in detail.

As I indicated, there are questions of development, of specific projects in Defense, and then there are the categories that we broadly call research. I don't know really what the definition of research in the figures as you are quoting them may be.

Mr. REUSS. Well, on that, we will supply you with the data supplied us by four departments, and if there has been any misrepresentation we would welcome your pointing it out.

Dr. HORNIG. I would be very happy to comment on it.

(The information referred to is as follows:)

EXECUTIVE OFFICE OF THE PRESIDENT,
OFFICE OF SCIENCE AND TECHNOLOGY.

Washington, D.C., March 4, 1966.

HON. HENRY S. REUSS,

Chairman, Research and Technical Programs Subcommittee, Committee on Government Operations, House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: Thank you for sending me the tabulation BOB Ceilings and Agency Expenditures for Foreign Research, Fiscal Years 1962-1967. I concur with the comments on these figures which the Bureau of the Budget is submitting for the record. [See p. 129.]

My only additional comment for the record is to note that we have reversed by administrative action a sharply rising trend of U.S. research expenditures in advanced countries, that the reductions in these countries by DOD and HEW—the two major agencies—have been substantial, that the research expenditures of Federal agencies in less developed countries are for research that meets the general Federal criteria, and that we have what we consider to be a reasonable balance between the national need for research abroad and the national need to conserve dollar expenditures abroad. We will continue to review the reasonableness of the criteria, of limitations on agency expenditures, and the substance of agency research abroad.

* * * * *

Sincerely yours,

DONALD F. HORNIG, *Director.*

Mr. REUSS. Now, what about the watering down of the Federal Council on Science and Technology policy guideline, where apparently we marched up the hill in August 1964 and said no foreign projects unless they cannot be carried out effectively in this country, and then we marched down again in December and said, well, if they can be carried out a little bit better elsewhere, even though they can be carried out effectively here, let's have them.

What's the background on that?

Dr. HORNIG. As best I can recollect the background, I don't think there was any thought of backsliding. Absolute standards are very hard to maintain.

I think the thought at the time was that it was a strengthening of these standards—that it must be demonstrated that the quality of any foreign research is above what we could obtain in this country. I think that our own checks would indicate that on the whole the standards that are being maintained by the agencies for foreign research are above the corresponding ones internally.

It's very hard to say what one means when one says cannot be obtained in the United States. What one needs to have is a puzzle solved. If one can find a more competent investigator abroad, it is more likely to be solved. If we need the results, this is a prudent investment.

Mr. REUSS. Let me ask—since we are essentially dealing with the English language here let me ask Mr. Trued, who sits at the Cabinet Committee level.

Mr. Trued, do you see a difference between a guideline which says no foreign projects may be undertaken where they can be carried out effectively in this country, and a guideline which says that foreign projects may be undertaken, though they can be carried out effectively in this country, if they can be carried out more effectively abroad? Do you see any difference between those two formulations?

Mr. TRUED. Well, I would think, Mr. Chairman, in all candor, that there is some shade of meaning there. Whether in fact it represents a substantial or significant change in the carrying out of actual operations, I don't know.

I think—from where I sit, the element of a control mechanism is inevitably going to involve the establishment of some feeling.

I think the thrust of our interpretation over the last 4 years that I have been intimately involved on this front in the administration has been toward a constantly more critical view of expenditures of any sort abroad. We hope that is carried out in the establishment of criteria that are raised so that in fact you get a reduction in dollar amount. But I cannot judge—

Mr. REUSS. I want to repeat my question. You don't see any difference in the two criteria that I just read to you? Do you want me to read them again?

Mr. TRUED. Would you please, sir?

Mr. REUSS. Yes. The original August 1964 criterion of the Federal Council on Science and Technology was that projects to be supported abroad are limited to those "which cannot be carried out effectively in this country." And then in December that guideline was repealed and another one was substituted for it which says projects may be carried out abroad despite the balance-of-payments impact "which can be carried out more effectively outside this country."

Now, the question is, do you see any difference between those two criteria?

Mr. TRUED. Yes, sir, Mr. Chairman, I said that I thought there is a difference in the shade of meaning there that is important. I prefer the previous one.

Mr. REUSS. How about you, Mr. Zwick? Do you see a difference?

Mr. ZWICK. Yes, Mr. Chairman. I would agree with Mr. Trued. I would like to, though, point out that the criteria that are binding are in the gold budget procedures, and they state "each agency will review its requirements for conducting activities abroad, with a view to terminating these activities, consolidating them, or restricting their scope, wherever this can be done without damage to the national interest, even though it may result in additional budgetary costs."

Now, those are the criteria which I said are consistent, I believe—

Mr. REUSS. Well, instead of terminating foreign research activities, they went up as between 1962 and 1966 from \$23.7 to \$28.5 million.

Mr. ZWICK. Mr. Chairman, I would not have thought that we would want to characterize our expenditure for remote area research in southeast Asia and so forth as being—which have in fact increased since 1963—as due to just poor standards. I think requirements for this sort of research have also gone up.

Mr. REUSS. Well, in your judgment is it a valid criterion that we will support research projects, though they can be effectively carried out in this country, if somebody thinks they can be carried out a little more effectively abroad? Is that tightening our belt sufficiently?

Mr. ZWICK. I would say that is not consistent with the guidelines the agencies have. We state that even though it may result in additional budgetary costs, you will do it here. So that the question, I think, really, hinges on the word "effectively."

Mr. REUSS. But the guideline the agencies have—and the only one they have—is the guideline issued by the Federal Council on Science and Technology, is it not? You admit that neither the President's Committee nor the Bureau of the Budget has issued specific outlines or criteria on foreign research. We have to get down to the Federal Council on Science and Technology documents to get those specific criteria. That is true, is it not?

Mr. ZWICK. No, sir, Mr. Chairman. As I said before, the gold budget procedures—which are the procedures under which agencies operate—apply to research.

Mr. REUSS. You are talking about the Bureau of the Budget Circular A-58 of July 7, 1964, are you not?

Mr. ZWICK. That's correct.

Mr. REUSS. We keep going over and over this. That doesn't have any criteria regarding research projects. It simply abjures all Federal agencies to cut down as much as possible. Isn't that about it?

Mr. ZWICK. But that is also binding on their research activities.

Mr. REUSS. Right. But it does not convey any real guidance. No matter what one spends, one can always say one could have spent more instead of cutting down as much as possible.

Mr. BROWN. Are you suggesting that the explanation for the increase in this country's research relates to the war in Vietnam?

Mr. ZWICK. No, sir. I said one of the categories of research that has gone up since 1963 is research related to remote area conflict and malaria. That is one category. But I would really defer to Dr. Hornig on the mix of research.

Mr. BROWN. Would you care to specify the amount of that increase with reference to this question just raised? I don't think we have to drag Vietnam into this thing if it's not really applicable. If it is, let's bring it out.

Dr. HORNIG. I must say I still don't understand the increase until I have had a chance to study these figures.

I am deeply aware of this. Along with the ones the chairman mentioned are criteria which urge them as much as possible to transfer projects to local governments, to urge them to increase their own expenditures.

In the case of the NIH, as I have indicated, there has been a drop of 30 percent in my figures in the research expenditures, and in the case of DOD there has been a drop of 50 percent in research and exploratory development. That is in Western Europe. I won't say Vietnam. But if we separated this from the problem of the lesser developed countries—in Western Europe my figures show a very substantial drop.

So what I have been aware of is a constant pressure on the agencies to cut back on their expenditures, to persuade the foreign governments to take over all the projects wherever possible.

I must say that the chairman is perfectly correct—that the wording is looser in the second statement.

On the other hand, it's quite impossible to say whether a piece of work can or cannot be carried out in the United States in black and white terms because as I said research is not something which one can purchase, and on which there is an assured result. It involves an element of judgment—whether the investigator has the competence and imagination to produce a result at all. And this, as I said, is a matter of administrative judgment by whoever supervises the research program.

Mr. BROWN. If we can leave Vietnam out of this—and if you will concede the chairman's point with reference to this particular change in meaning of the guideline—can we discuss the word "effectively" and ask to what that refers.

Dr. HORNIG. The research project must be judged both by its timeliness, by the time scale on which you need the result, by the competence of the investigator and his team, and the adequacy of the facilities he has, the uniqueness of his approach. Effectiveness is judged, therefore, by other competent, scientifically trained people

who judge whether it is more likely that a result we need will be obtained.

I think this is the only sense in which one can use the word "effective" in judging in advance a research investigation, which after all is an attack on something you don't know—otherwise it would not be research.

MR. BROWN. In other words, there is no financial shade to the meaning of "effectively" here. You are talking purely in scientific terms. You are talking of the scientific result rather than a fiscal result, the cost of the item, or the economic efficiency, or as to our gold problem.

DR. HORNIG. I think in that particular phrase, that is substantially correct. But in the totality of the document, there is considerable pressure to reduce the expenditure and particularly to reduce the balance-of-payments expenditure.

MR. BROWN. Well, my point is that we are putting a scientific judgment up against a fiscal problem here, and the scientist is apt to resolve this in favor of the scientific result rather than the fiscal problem which we face. So that the guideline as written gives the scientist a guide which may have been written from the standpoint of a fiscal attitude, but is resolved by the scientist from a scientific attitude.

DR. HORNIG. I think you have touched on a very fundamental dilemma. We do not know, either for foreign expenditures or American research expenditures, how to apply cost effectiveness criteria. And the reason, of course, is that the precise economic result of the research in general cannot be known, if it is research rather than developmental activities one is speaking of.

I think we do try to merge, however, the stringency of the criteria with the amount to be expended, and this is why we work together with the Bureau of the Budget.

MR. BROWN. May I pursue a couple of other questions here. This goes back to—and perhaps I am getting too far afield from the point which you would like to continue to work on.

Where these criteria of effectiveness are established by the scientists in determining whether it is effective—more effective to do it overseas than it is to do it in this country, can you comment with reference, let's say, to the area of medicine, to the great man theory—the idea of taking someone abroad to study under someone who has developed a technique or is involved in a research project in his own lab versus, say, bringing the man to the United States to do the job here?

DR. HORNIG. This question comes in two parts.

I would note that progress in science is composed of two things. One is that there must be a large body of work to produce new ideas. Nevertheless, I think historically it is true that a very small number of men in all parts of the world have consistently played the leading role and displayed the imagination, produced the brandnew ideas which made the most significant advances. So that although the great man theory can be overdone and sometimes is, there is little doubt in science as in other activities, that some men do, very, very much better than the average.

Now, as to whether the man should be brought here or we should go to him is of course partly a question of whether he will come or not. But if the man is abroad and the leadership he displays will color

and improve a very large volume of work which is going on in the same general areas in the United States, it may be very important for us to have access to his laboratories and to be able to send American investigators either to work with him directly, so as to color their own activities when they come home, or, by learning of his work from the literature, from international meetings and discussions, to so improve the quality of the work in our own laboratories that there are very substantial financial benefits in the sense of increased productivity, increased advances in our health, for example, over what we would otherwise have achieved.

Mr. BROWN. If we can stay in the health area for a moment, I seem to recall that Dr. Sabine after development of his polio vaccine went to Russia at the request of the Russians, and with our permission, to present his findings to the Russians.

Now, do we have any understanding with other nations whereby the development or the progress of a research effort will be shared back and forth between the two countries on such a basis? In other words, has Russia sent anyone here to discuss some research progress that they have made in medicine in exchange for the kinds of thing that Dr. Sabin went to Russia to present?

Dr. HORNIG. Yes, sir; is the simple answer.

There is no area of human activity which is more shared among people than scientific research. This is done in a variety of ways. There is a tradition of publication——

Mr. BROWN. You are eliminating space?

Dr. HORNIG. I am eliminating some technological areas. But in the area of scientific research there is publication and free dissemination of literature. Not only are Russian journals obtained in the United States, but Chinese journals are available in the United States.

This extends not only to the free publication, but to general personal correspondence between investigators in similar areas.

Through international meetings and symposia the results are exchanged, as well as by the travels of scientific investigators in both directions.

With regard to your specific question, Russian scientists do come to the United States to exchange their techniques.

I am not prepared to cite specifics now. I know of many delegations in the atomic energy area. I know of a delegation of Russian zoologists.

But there is a tradition of exchange which has developed over the last century which is at the heart of the progress of research.

Mr. BROWN. Can you relate this, again, to the thought of sending people to study under a great man of medicine, say, versus bringing the great man here, in light of our balance-of-payments situation?

Dr. HORNIG. If the great man and everything around him in his laboratory can be brought here and kept here, this is probably a preferable method. But this choice is not always available to us.

Mr. BROWN. Is this given consideration in our balance-of-payments relationship, in such a decision?

Dr. HORNIG. I think you are aware that the Europeans feel very acutely about what they consider the brain drain, the steady flow of people——

Mr. BROWN. I am talking about bringing the man here for the sharing of his research, instead of sending somebody over there to study under him for a year.

Dr. HORNIG. Numbers of people do come to the United States for just this purpose. But I would only caution you again, from my own experience as an investigator, the results of research are not something you can simply tell people.

I have had to pick the laboratories my students went to. Where I send them, if I want them to get the very best in modern science, is not just where they can spend a little time learning what has been achieved, but it is to work actively in the environment in which new ideas are being generated, and there are very few such places in the whole world.

Mr. BROWN. Is there some way of bringing this into relationship with the balance of payments?

Dr. HORNIG. As I said, we do take all of the steps you mention. Large numbers of Europeans do come each year to the United States to bring their ideas and their techniques into American laboratories.

American universities and industries do bring talented Europeans—not just beginning students, but men of high talent—to come and remain permanently in the United States. All of these are steps which achieve the result you mentioned.

Mr. BROWN. On a similar level, there was some comment made about this—the determination is made on the basis of competition—competition was the word used—in making research grants between foreign and domestic locations.

Can you push this a little further—what do you mean by competition?

What are the factors in this?

Dr. HORNIG. Well, the way research proposals are normally handled, for instance, in the National Institutes of Health, is that they are referred to study sections of experts in the field who read the various proposals and try to assess them in terms of the competence of the investigator, the quality of the ideas he presents, the adequacy of his facilities to carry out the idea. This is a matter of judgment for which we procure the best talent we can in the United States.

Now, the competition here means foreign proposals are judged by the same study panels and must be judged to be substantially better ones than the corresponding ones of the United States.

But as I have indicated, this is a matter of judgment. I know of no way to tackle it except to get more competent people in a given area. I assume that their prejudices, if any, are in favor of their American colleagues.

Mr. BROWN. Well, I could pursue this on two different levels, if I may, just for a minute.

First, the question of the dangers of singlemindedness in research. I will come back to that in a moment. And then the other question is this business again of competition.

Is it possible to set some kind of a standard between the level of superior equipment or superior facilities in an overseas situation, and the development, the importance of development of our inferior facilities or inferior situation in this country? Let's stay away from tsetse flies and things you don't find here. But with reference to normal

research areas which may have equal significance in both countries—can you answer that question?

Dr. HORNIG. It's very difficult to be quantitative on the scale of scientific merits, but I think one should note that the greatest part of the research we talk about has some unique reason to be abroad and is not simply a matter of being a little better.

We have gradually tightened up on the agencies, and the funding situation in many ways in Western Europe has been one of a phase down, dictated by how fast it could be contracted, that is in the research area, without seriously disrupting our relations with the Europeans.

But I don't think it's possible to set up a simple quantitative measure of merits so that one could lay down a guideline which says therefore it must be 50 percent better to go to Europe or something of that sort.

I think substantially it has to be a qualitative judgment.

Mr. BROWN. What I'm really pushing for, Dr. Hornig, is 50 percent of what? Fifty percent of economic efficiency, fifty percent of the scientific ability? Fifty percent of the laboratory resources? What are we talking about?

Dr. HORNIG. It depends completely on the area. If it is a developmental project, one takes much higher economic efficiency. If it were in medicine, 50 percent might be 50 percent more likelihood that a solution to the medical problem might be obtained at all.

Mr. BROWN. Are you talking about speed, a crash program, or are you talking about—

Dr. HORNIG. No—

Mr. BROWN (continuing). A simple matter of finding an answer sometime.

Dr. HORNIG. Well, it might be a matter of time. But it might be the probability of finding any answer at all. After all, most of the problems, such as cancer, that we have attacked, we have been attacking for many years and we have not yet found an answer.

Mr. BROWN. There are fads in this method of attack, are there not? In other words, it is the style now to go after virology in cancer, whereas some years ago that was not the case.

Dr. HORNIG. Yes, there are—whether one calls them fads or styles—at any given time, I think the best evidence available to people suggests that some approach is likely to be the most fruitful one. Now, of course, they might be wrong.

Mr. BROWN. Is this the way the determination is made on grants—that the school solution this year is that a certain approach is likely to be most fruitful?

Dr. HORNIG. It usually comes about because that approach in recent years has been shown to be the most fruitful. One can never guarantee—and this is what always marks the next great man, the one who finds a brandnew approach that is even better.

Mr. BROWN. Is this the criterion by which the determination is made from a scientific standpoint in medicine, for instance—that currently the greatest area of activity is in virology?

Dr. HORNIG. Well, our efforts are spread over a very wide area. I think it is true that the general area of chemotherapy, what is called molecular biology, and chemical genetics, has been the area in which the most substantial pure scientific advance has been made in the last

20 years, and in which the most rapid progress is being made right now, so that there is some emphasis in the areas that seem to be fruitful, yes.

Mr. BROWN. Are there any dangers in this?

Dr. HORNIG. Yes, there are dangers if one is blinded to the possibility that still newer approaches will be still better. All one can do is to try to persuade everyone concerned to keep his eyes wide open.

Mr. BROWN. Well, what I am getting at is the worry about single mindedness.

Is there a danger in singlemindedness in our approach on some of these research projects?

Dr. HORNIG. I don't really think so. I think our program now is characterized by very, very great depth. It is, of course, possible that the emphasis is not perfect.

Mr. BROWN. Let's go back to "effectively," and the prospect of results.

We are going for breadth and the prospect for results. Now, where does "effectively" come in?

Dr. HORNIG. I think "effectively" comes in as a prospect for important results, and can be measured either in terms of the possible importance of the results or the probability of achieving the result, or the probable time scale for achieving the result. They may all apply.

Mr. BROWN. And in certain areas the time scale is more important than the cost factor, or the single mindedness of the approach is more important than the breadth of the approach?

Dr. HORNIG. Yes—if there are many investigators whose work is waiting for a result in order to continue their own work, then the time may be very important. It may be very cost effective, too.

Mr. BROWN. Now, can you relate any of this to the balance-of-payments problem?

Dr. HORNIG. It's very difficult, as I said, to establish a quantitative formula. It is related in the sense that the criteria are made much harder because of the balance-of-payments problem. We have made great efforts to persuade Europeans, particularly, to take over the costs and to support their people even when the work was of very, very high quality by all these standards.

Mr. BROWN. Well, would it be easier for—I shouldn't say easier—is it more effective—I guess I have to use the word now—for you to justify your program in the scientific research area for someone who is budget minded, or for someone who is budget minded to write a criterion by which you can assess the effectiveness, the desirability of your research program?

Dr. HORNIG. In the first place, I try to be budget minded. I think one can only say that when one measures what has come out of the programs we have designed in terms of what they have cost us, and this is the primary criterion by which one decides whether the level of effort is budgetarily excessive or deficient, they have been effective.

If someone can identify opportunity we are missing, then we try to persuade our budget fund that the opportunities must not be missed.

If, on the other hand, programs are criticized as not having yielded good results, then in general they are cut back.

Mr. BROWN. In your statement you suggest the possibility that the two criteria, the scientific and the budgetary, are complementary. In fact, are they not frequently contradictory?

Dr. HORNIG. I am not quite sure what you mean. I would say projects we support must meet two criteria—they must be scientifically worthwhile and we must be able to afford them. At times things are not carried out for either of those two reasons.

Mr. BROWN. But can these two be easily related? That's what I am getting at. In other words, something that is scientifically worthwhile, that is conducted on a crash program basis, using the great man theory, and a single line of approach of the scientific community in that area, could very easily, I would think, be highly contradictory to our budget situation and balance-of-payments problem. Is that not correct?

Dr. HORNIG. I think it could be, but I don't think it has been.

I think that the history of the last 20 years—I would say that we have had very effective scientific programs which have developed both the base and the quality.

America has—I am not speaking only of foreign research, but this has been an extremely healthy period in American science. The economists estimate that two-thirds of the growth of GNP is related to technological development. That's one measure. We have had an outstanding period of technological development.

On the other hand, I might note that whereas America between 1920 and 1940 got something like 12 out of 72 Nobel prizes, in the period since World War II this country has gotten more than half.

Now, I cite these things only to say that by these measures, which are the only ones I know how to apply, this has been an effective program.

Mr. BROWN. You know, I'm in the newspaper business. Your comment about the prizes interests me and amuses me a little, because there is this story in the newspaper business that one good way to go broke is to have a prizewinning newspaper.

I am trying to relate, though, the scientific community to the thoughts of the economists—if we assume economics is not a science—on this particular problem of balance of payments.

If we make great scientific progress and still go broke in the process with reference to our balance of payment—of course, we are talking about one aspect, research—but how much better off are we?

Dr. HORNIG. Obviously, we are not much better off. But let me put it this way.

When we talk about total research and development programs, most of it normally concerns what I would call development, which has specific end goals. Where there are specific end goals, we can apply cost effectiveness criteria and do.

Now, at the end of the spectrum, which is roughly 10 percent, which is the generation of the new knowledge from which medical advances are made, from which technological advances are made, we do not yet know how to apply cost benefit, or business argument. We can only use our experience, the extent to which our technology and our medicine has depended in recent years on the new knowledge which we have turned up in the very recent past. What we have learned is that the

cycle from turning up knowledge to the time it is applied is steadily shortening. I hate to make any generalizations, though.

So that I would say that as far as the research under this spectrum is concerned, it is essentially a level of effort argument that we use, and then do our very best to make that the most fruitful effort that we can.

Mr. BROWN. From an economic standpoint?

Dr. HORNIG. I think I take it as axiomatic here that the best science, if it provides knowledge which will be applied in subsequent stages, is also the economically best investment; yes, sir.

Mr. BROWN. And how is this in practice accomplished with reference to the guidelines?

Dr. HORNIG. I think in practice here most of the developments that are undertaken are undertaken because there are imperative national needs, such as the joint development of VSTOL aircraft, and so on.

In the case of pure research, we don't always take it into account because we don't finance the research until it cannot or will not be financed by the local government, and if it is judged to be of substantial value to the very, very much larger research program we are carrying on domestically.

Mr. REUSS. Dr. Kidd, you raised your hand.

Dr. KIDD. My name is Charles Kidd. I am executive secretary for the Council on Science and Technology.

Much to my regret I spent a lot of time drafting this Federal Council document. I think I may be able to shed some light on the questions that have been raised.

The amendments of December over the August version were intended to tighten the criteria. The major point that was made in these amendments in December was to add specifically a stronger admonition to the agencies to observe their expenditure in the light of balance-of-payments criteria. We added:

In addition to the usual rules of good management which help to insure the efficient use of U.S. funds, agencies are expected to limit expenditures for scientific activities abroad in the light of the U.S. balance-of-payments situation. In line with present policies on minimizing U.S. outlays overseas, emphasis should be placed on encouraging foreign support of research, developing joint United States-foreign projects, and consideration of the domestic projects in lieu of foreign ones.

That's the end of the quote. That was added. That was the primary amendment and the primary intent of the change in December.

With respect to the other clause that has been referred to, the intent was to write a more administerable clause, and not to in any way weaken the force of the document.

The earlier committee draft version said "cannot be carried out effectively in this country." We thought, when we considered it before submitting a proposal to the Federal Council, that it would be better to say "can be carried out more effectively outside of this country."

Now, the words might be interpreted to mean a weakening, but the whole force and intent of these changes in December was to make the criteria more strict.

Mr. REUSS. Did you clear this with the Bureau of the Budget or with the President's Cabinet Committee before you made the change?

Dr. KIDD. No. We accepted the general guidance of the Treasury. The Bureau of the Budget has a representative on the Federal Council for Science and Technology.

Mr. REUSS. Well, let me ask our friends who worry about the balance of payments.

Mr. TRUED, do you think that a guideline which limits projects to those "which cannot be carried out effectively in this country" is looser than a guideline which limits projects to those "which can be carried out more effectively outside this country?"

Mr. TRUED. Mr. Chairman, I had labored under the conviction that what was done in December at the time we announced the reinforcement of our overall balance-of-payments program was a tightening.

I think the sense of it should be that any research that can be carried out here ought to be carried out here.

Mr. REUSS. But it says just the opposite. They took that language out. The language of August says if it can be carried out effectively in this country don't do it abroad, which is what you have just said. But they amended that in December to say that if it can be done effectively in this country—if it can be done more effectively someplace else, spend the money.

Now, are you for that or against it?

Mr. TRUED. I agree with you, Mr. Chairman, that language is a weakening of it, as I indicated a while ago. But I accept the interpretation of my colleague here, that the intent was a tightening overall.

Mr. REUSS. I accept entirely the intent. But we cannot look at the intent. We have to look at the words in English.

The fact is, is it not, that this was a considerable opening of the doors to foreign projects. Is that not so, Mr. Trued?

Mr. TRUED. In the light of the wording; yes, sir.

Mr. REUSS. Now, let me ask Dr. Hornig this question.

You have said that there has been some cutting down of dollar impact expenditures in Western Europe, and that the expenditures increase occurred elsewhere.

It is a fact, is it not, that a research dollar which we spend in, say, Canada or Japan, neither of which are Western European, can be just as devastating to our balance-of-payments situation as one spent in Western Europe?

Dr. HORNIG. Yes, sir. I have the figures. The figures I have for NIH, however, show that the research dollars spent in Canada dropped from \$2,060,000 in 1963 to \$1,431,000 in 1965, which is a 31-percent decrease in that period.

Mr. REUSS. Yes. That's one agency in one country.

I just wanted to be sure our minds agreed that dollars lost are dollars lost, whether they are lost in France or in a developing country.

Dr. HORNIG. That's correct. In the developing countries one must trade the balance-of-payments problems against our other foreign policy objectives.

Mr. REUSS. Yes. But here we are talking about expenditures by the science agencies—the Department of Defense, HEW, AEC, and NSF. These are not foreign aid agencies, are they?

Dr. HORNIG. No, they are not.

Mr. REUSS. Your mission is not connected with the building up of the scientific excellence of other countries, is it?

Dr. HORNIG. No. It is not to build up this scientific excellence.

On the other hand, in the health area, health competence which solves disease problems in far parts of the world may contribute very substantially to the solution of our own.

Mr. REUSS. Let's address ourselves to the point you made that international cooperation in science is extremely important, and I certainly agree. We should make our science available to the world, and we hope they will make their science available to us, and by and large this does happen—even across the Iron Curtain on occasion.

However, the question which confronts some of those interested in our balance of payments is; Should we pay not only for our own science, and makes that available to the world, but should we also pay for somebody else's science so that they can make it available to us?

Let's take a specific case that we had before. The United States is currently granting \$73,800 to a distinguished French geneticist, Mr. Jacques Monod, for his studies in the Pasteur Institute of Paris.

There is no question whatever of the scientific excellence and the uniqueness of what he is doing. The only question is: Should we carry on an obligation which the French Government ought to carry on?

Now, what would you have to say about that?

Dr. HORNIG. Let me make two comments.

One is that I cannot comment on the wisdom of the French Government. I cannot understand, for the life of me, why they have not given Mr. Monod and his two colleagues who recently received the Nobel Prize all the support they received and more. If they lived in the United States we would have. But as to the wisdom of our very small investment in his institute, I would say that was money very wisely spent. The reason is that we spend millions of dollars in the areas in which Monod and his colleagues have shown us how to do the work much better, where they have developed new approaches and new techniques. Therefore the state of advance of our own knowledge has been very, very much advanced in this particular case.

Secondly, numbers of American investigators have—and that is part of the same picture—have come to work in his laboratory, the Pasteur Institute—to learn their techniques, their ideas and their approaches. This has contributed very strongly to the progress in the United States. So that I think that we have gotten very substantial rewards.

Now, it would have been much better, I think, if the French Government had supported him adequately. But failing that, we had much to gain by having that laboratory open to American investigators.

Mr. REUSS. Don't you think, Dr. Hornig, that one of the most arresting factors which would cause the French Government to support its own science adequately would be the cessation of American support for them?

Dr. HORNIG. Yes—and in general, of course, that has been happening in France.

I would like to make one other point about Monod. All of the money which Monod is receiving is used for the purchase, or substantially all of it, of equipment made in the United States. So that I am not sure that at the moment this contributes to our balance-of-payments deficit at all.

But I think the point you raise is a very important one, and this is why we have been phasing down, to persuade European countries to take up these expenditures, because we don't want in any way to excuse them from expenditures they need to make.

But when our own priorities are such that we need a result, then even if they are unwise, it may be in our interest to fund a particular piece of research, or a particular investigator.

Mr. REUSS. Mr. Trued, when General de Gaulle and the Bank of France demand gold of the U.S. Treasury for their holdings of dollars, are you able to dissuade them by pointing out that the gold claim arose from a generous benefaction of the U.S. Government to their own scientists who are not able to support themselves?

Mr. TRUED. No, sir.

Mr. REUSS. They just won't listen to you.

Mr. TRUED. No. French policy is firm and clear on that point, and they have listened to none of the other considerations that might enter into their decision on the gold fund.

Mr. REUSS. Mr. Brown.

Mr. BROWN. Well, I want to go back to the question—are we buying information, then, or the access to information by our grants to Monod?

Dr. HORNIG. It is information. What we are buying, I think, is the development and advance of our own efforts which in these fields have followed his lead. What we are buying is access to his laboratory by our investigators in the training of some of our people in his laboratory.

Mr. BROWN. But this information, the information which he has developed, I thought we discussed a minute ago, is freely available through scientific journals and so forth. You said we had free access to scientific information.

Dr. HORNIG. Well, the work that he has done is freely available. But the work that he would not do in the absence of financing would not be available to anyone—French, American, or anyone else.

Mr. BROWN. In other words, we are buying an improvement in the state of the art.

Dr. HORNIG. That is correct, sir.

Mr. BROWN. Now, if we are not buying this—I go back to the chairman's question—will the French be buying it?

Dr. HORNIG. It is very hard for me to predict what the behavior of the French Government would be, either with respect to Dr. Monod or to any other problem.

Mr. BROWN. Well, let's assume, if we may, that they would not. Now, what do we have then with Monod? What is his attitude? Does he start raising animals or something else and get out of the field?

Dr. HORNIG. Well, I think we should be clear that the major part of Monod's support did come from the French Government. We are speaking of an incremental support from the United States. So I presume he would have operated at a reduced level of activity, although I suppose at some point he might have gotten so fed up that he would have left France. He has made very, very strong statements.

Mr. BROWN. What are we buying—time?

Dr. HORNIG. No. We are buying an advance in a field of medicine which we consider very important to our own progress.

Mr. BROWN. If we had not put our money in—my question is—would it have just gone slower with Monod, or would Monod have given up the project? Would Monod have given up France? That's my question.

Dr. HORNIG. My expectation is that it would have gone slower. Possibly in the absence of some of the equipment, some discoveries might not have been made at all.

Mr. BROWN. Then we are making a determination here affecting the balance of payments on the question of whether or not this should be—Monod's efforts should be, if I can use this term, a crash program, or whether or not we should contribute to the speedup of the scientific advancement which he would have made in time anyway with French help.

Dr. HORNIG. Let me put it this way. We are trying in a variety of ways to improve the health of the American people. Time is important. Advances that are made years later result in people dying in the meantime. So I don't think the word crash program is appropriate. But I think that we are very much interested in obtaining medical advance on a timely scale as well as in some scientifically absolute terms.

Mr. BROWN. Again, how do you relate the money sent to Monod, in light of our balance-of-payments problem? In other words, my question is this. It is like a billiard shot. If the French were to put the money in, not only would this have not created more of a problem with our balance of payments but it would have created less of a problem because as you have indicated Dr. Monod used the money that we sent him to buy American-made equipment. And if the French had given him French funds for this purpose, then our balance-of-payments situation would have been relieved by that much.

Dr. HORNIG. Well, I can only reiterate that the ideal situation would have been adequate support for Dr. Monod by the French Government. When it is not obtained, then we have to make a judgment here. He is acknowledged to be doing the most outstanding work in this area in the entire world, and a judgment must then be made as to whether the balance-of-payments deficits we incur as a result of assisting him do or do not justify this in the light of the probable gains in American medical progress as a result of this work.

Mr. BROWN. Is there any other country besides ours and France who was ever interested in Dr. Monod's work in terms of grant assistance or investment in his efforts?

Dr. HORNIG. I am afraid I cannot give you a definite answer. Private foundations have been as well as the American Government.

Mr. BROWN. Private American foundations

Dr. HORNIG. The only ones I know of are American.

Mr. BROWN. Over which the U.S. Government has no control.

Dr. HORNIG. That's right.

Mr. BROWN. Had the English been willing to put in pound sterling in Dr. Monod's work, our balance-of-payments situation would have been better, and our scientific community would have been no worse off, because as you indicated the information is freely accessible.

Dr. HORNIG. That's correct. We would be better off if anyone else had supported Dr. Monod. But the problem that always faces us is when no one else does, then we have to make a judgment of our own,

as to whether it is worthwhile, granted these great balance-of-payments difficulties, or whether it is not.

Mr. BROWN. Is there any international conversation going on at any level, the U.N. or any place else, to determine what other countries might have been interested in Monod, if we had not gotten there "fustest with the mostest"—that somebody else might have taken care of the problem?

Dr. HORNIG. Not Monod particularly, but there is very great international discussion as to the sharing of scientific effort through UNESCO—

Mr. BROWN. I am talking about financing—not efforts.

Dr. HORNIG. All of the countries of Europe spend money outside of their boundaries for the same reason that we do. In fact, in terms of percentage of efforts spent outside of the boundaries, we are the lowest of any of the Western countries. As I have noted in my testimony, the Dutch, I believe, spend 17 percent of their total effort outside of their boundaries. This is because they are a small country, and there are many complicated problems. We spend less than a half percent. Seventeen percent of their R. & D. effort is spent outside of the boundaries of the Netherlands. All the other European countries spend more outside of their boundaries than we do.

Mr. BROWN. A question has been raised about private foundations.

Can you relate the combined national effort, both governmental and private, between us and the Dutch?

Dr. HORNIG. I do not have any figures on the private foundations in the case of the Dutch. I am not aware of any great expenditure privately there. But I am afraid I just do not have the figures with me.

Mr. BROWN. Are there total figures for U.S. effort?

Dr. HORNIG. I have not seen any combined figures for foundation spending abroad. This is a matter that I am now anxious to look into for my own satisfaction.

Mr. BROWN. Again, the balance-of-payments situation does not discriminate between Federal and private money. The only area over which we have any control is the question of Federal money, which is the limit of action we might take. But I am sure the other area would be of interest.

(The following information was supplied for the record:)

The National Science Foundation reports that private foundations spent \$14 million in 1964 for oversea research. This is roughly half the total Federal foreign research support. About three-quarters of the private foundation foreign research expenditures are accounted for by the Ford and Rockefeller foundations and are expended largely in the lesser developed countries.

Mr. REUSS. This foreign research spending by continental countries that you mention, Dr. Hornig. In fact, much of that is made through CERN, the atomic energy agency in which they pool their resources.

Dr. HORNIG. There is a variety of such efforts. CERN is one of them. ELRO and ESRO are others. Then there are some cooperative efforts, through OECD.

It's largely through cooperative efforts, yes.

Mr. REUSS. Their foreign research programs are not like ours. Does any foreign government support anyone in the United States, which has a not insignificant scientific community—do they support projects?

Dr. HORNIG. Well, I can only cite one specific which caused great embarrassment, and this, of course, is that of the support for the reactor in Fayetteville, Ark., which comes from the Germans. And in that case they have just not been granted a license because of the magnitude of foreign influence involved. This is still being resolved. But that is at least one specific case.

They indirectly spend money here by sending people to this country, which is similar to our fellowship programs.

Mr. REUSS. Mr. Zwick, let me refer to a couple of your Bureau of the Budget letters, in this case to the National Science Foundation.

If you refer to the Bureau of the Budget's letter of August 2, 1963, to the National Science Foundation and look at the last paragraph—"It is requested that you give immediate consideration to this possibility and that you notify me of your conclusions and of the actions taken on this matter: Prohibitions against use of predoctoral fellowships for study abroad." Now, the fact is, is it not, that the National Science Foundation refused to adopt your suggestion and continued its grants for predoctoral fellowships for study abroad. I refer to the Foundation's letter to the Bureau of the Budget, dated September 6, 1963.

(The letters referred to are as follows:)

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., August 2, 1963.

Dr. LELAND J. HAWORTH,
Director, National Science Foundation, Washington, D.C.

DEAR DR. HAWORTH: Federal agencies can look with some satisfaction on the results they have obtained to date in reducing the adverse impact of their operations abroad upon the U.S. balance of payments. The President has given recognition to these results in his special message on the balance of payments, and he has directed that we intensify our efforts and achieve further savings over the next 2 years. Accordingly, we must take additional steps to pare the oversea expenditures of the Federal Government to the absolute minimum. We must proceed on the premise that no saving is too small to be pursued and realized; I urge your continued cooperation toward that end.

It is in this respect that we have conducted the review of your report on offices and missions abroad (bulletin 63-13) and your quarterly submission under Bureau of the Budget Circular No. A-58. We are gratified to note that the Foundation's 1964 research grant obligations in Western Europe, Canada, and New Zealand fall considerably under the \$750,000 ceiling requested by the Bureau.

In addition to the actions which you have proposed in your review and quarterly submissions, we believe the seriousness of the balance-of-payments problem requires that the following actions be taken promptly by your agency:

- 1. That the additional position proposed for the Paris office not be established.
- 2. That the Paris and Tokyo offices each be reduced by one presently established position.
- 3. That a reduction of \$37,000 be made in expenditures entering into the balance of payments for construction of the Chilean observatory.

To reflect the results of these actions, we are including revised targets and estimates for your agency in the report to the President, as follows:

[In thousands of dollars]

	Fiscal year 1964 target	Fiscal year 1965 estimate
Payments.....	4,510	5,000

Our review also suggests the following possibility of still further savings which has not been reflected in revisions of the targets. It is requested that you give immediate consideration to this possibility and that you notify me of your conclusions and of the actions taken on this matter: Prohibitions against use of predoctoral fellowships for study abroad.

I count on your personal attention in seeing that your agency does the utmost to meet the goals which the President has set for reducing Federal expenditures abroad.

Sincerely,

KERMIT GORDON, *Director.*

NATIONAL SCIENCE FOUNDATION,
Washington, D.C., September 6, 1963.

HON. KERMIT GORDON,
Director, Bureau of the Budget,
Washington, D.C.

DEAR MR. GORDON: The Foundation has given careful consideration to the proposals outlined in your letter of August 2, 1963, concerning expenditures which enter into the balance of payments. The desirability of these proposals have been considered in terms of their impact on the Foundation's ability to satisfactorily conduct its responsibilities in the international area.

The Paris office was established in 1960 primarily as a means for supporting U.S. interests in the science activities of OECD. This responsibility was assumed by the Foundation at the request of the State Department. Inasmuch as the assumption of this function is secondary to the Foundation's basic responsibilities, we are considering the advisability of notifying the State Department that the Foundation will no longer assume this function, and of closing the Paris office. The Foundation's interests, other than OECD, which are currently the responsibility of the NSF Paris staff could be handled through a single Western European science office which would represent the interests of all Federal agencies. The establishment of a single Western European office would possibly result in additional economies and the Foundation would be willing to participate in the establishment of such an office.

The staff in Tokyo has been active in supporting the United States-Japan cooperative science program for which an amount of \$2 million is budgeted in fiscal year 1964. This very important project in international scientific cooperation is in a critical stage of development and the Foundation staff members in Tokyo have an important continuing part in assuring the success of this effort. This staff also has an important responsibility in the area of foreign science information. It does not appear to be in the national interest to curtail the activities of this staff at this time by a reduction of one in the existing minimum staff.

The reduction of fiscal year 1964 expenditures entering into the balance of payments and related to the construction of the Chilean observatory would be a deferral and not an elimination of these expenditures. The present planning for the construction of the observatory provides for the fabrication and procurement of most of the construction items and scientific equipment in the United States. A substantial portion of the expenditures estimated as entering into the balance of payments is for payment of local labor. The employment of local labor has been held to a minimum in the construction of the mountain access road by using heavy equipment brought in from the United States because this was the most economical way to do the work. It might be possible to reduce the participation of the local labor force in other parts of the construction by increasing the amount of equipment brought in from the United States, although this probably would increase total costs. However, the Association of Universities for Research in Astronomy, the contractor for this project, has found it extremely beneficial to utilize local labor and facilities wherever this is feasible and economical. This practice has the support of the Foundation and we would like to continue it.

Rather than establish a rigid control on expenditures, it is proposed that the Foundation discuss this matter with the contractor to determine what reductions, if any, can be made without impairing progress on the project. It is important that no action be taken which would impair the excellent relationships with the local community which presently exist since the success of the

Inter-American Observatory in Chile depends to a large extent on the cooperation and support of the Chilean Government and the local community.

A prohibition against the use of predoctoral fellowships abroad would restrict the National Science Foundation fellowship program in a very significant way. Section 10 of the National Science Foundation Act, under which these fellowships are awarded, authorizes the award of fellowships for study or work at appropriate nonprofit American or nonprofit foreign institutions selected by the recipient of a fellowship award. The purpose of this provision is to leave the choice of the institution with the individual fellowship applicant. This freedom of choice is an important part of the fellowship since it allows the individual to select an institution which in the applicant's judgment best meets his educational objectives. Under this language it is questionable whether the Foundation could refuse to award a fellowship solely on the basis that the applicant intended to study at a foreign institution. For these reasons the Foundation considers it desirable to continue the use of predoctoral fellowships for study abroad.

The reduction of expenditures abroad for programs sponsored by the National Science Foundation will be a matter of concern and urgency for all members of the Foundation staff. We will continue to screen our activities to determine whether there are areas other than those mentioned in your letter where appropriate reductions can be made.

Sincerely yours,

JOHN T. WILSON, *Acting Director.*

Mr. ZWICK. Yes, NSF still has predoctoral fellowships abroad, but they have been sharply reduced in number.

Mr. REUSS. Then I refer you to the letter dated August 7, 1964, by the Bureau of the Budget, again to the National Science Foundation, in which Budget stated the following:

We note in the case of postdoctoral fellowships that the Foundation does not formally require special justification for study in foreign institutions. The National Institutes of Health, on the other hand, in its fellowship announcement for postdoctoral applicants states that "study abroad may be approved when satisfactory evidence is furnished that the training desired is best obtained in a foreign institution." While recognizing the value of overseas study at the postdoctoral level, I can see no reason why the Foundation should not consider adopting a similar requirement for its applicants in order to insure that study abroad will be of substantial benefit to the individual. If you have no strong objection to initiating such requirement, I would hope that it might be adopted as soon as possible.

In fact, this recommendation was not adopted, was it?
(The letter referred to is as follows:)

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., August 7, 1964.

Hon. LELAND J. HAWORTH,
Director, National Science Foundation,
Washington, D.C.

DEAR DR. HAWORTH: I have again reviewed Government-wide international transactions, including those of the National Science Foundation, and am gratified to note the steps you have taken to reduce expenditures abroad and to curtail overseas offices. However, the impact of Federal expenditures abroad is still of concern, and we must continue to look for areas where further savings may be possible.

We note in the case of postdoctoral fellowships that the Foundation does not formally require special justification for study in foreign institutions. The National Institutes of Health, on the other hand, in its fellowship announcement for postdoctoral applicants states that "study abroad may be approved when satisfactory evidence is furnished that the training desired is best obtained in a foreign institution." While recognizing the value of overseas study at the postdoctoral level, I can see no reason why the Foundation should not consider adopting a similar requirement for its applicants in order to insure that study abroad will be of substantial benefit to the individual. If you have no strong

objection to initiating such a requirement, I would hope that it might be adopted as soon as possible.

Sincerely,

KERMIT GORDON, *Director.*

Mr. ZWICK. It is my understanding it was adopted. I will have to check that. But it is my understanding that it was.

Mr. REUSS. You are talking about the second recommendation, the letter of August 7, 1964. I now call your attention to a letter dated August 13, 1964, to the Bureau of the Budget from the National Science Foundation which says:

This is in reply to your letter of August 7, 1964, in which you suggest the desirability of the Foundation following a practice similar to that of the National Institutes of Health in requiring that postdoctoral fellowships for study abroad may be awarded only when satisfactory evidence is furnished that the training desired is best obtained at a foreign institution.

I am skipping a portion of the letter.

I do not believe, under our present statutory authority, that we can go further in limiting the choice of institutions in these fellowship programs.

In other words he told you "No."

(The letter referred to is as follows:)

NATIONAL SCIENCE FOUNDATION,
Washington, D.C., August 13, 1964.

HON. KERMIT GORDON,
Director, Bureau of the Budget,
Washington, D.C.

DEAR MR. GORDON: This is in reply to your letter of August 7, 1964, in which you suggest the desirability of the Foundation following a practice similar to that of the National Institutes of Health in requiring that postdoctoral fellowships for study abroad may be awarded only when satisfactory evidence is furnished that the training desired is best obtained at a foreign institution.

The Foundation awards its fellowships, including postdoctoral, pursuant to section 10 of the National Science Foundation Act of 1950, as amended (42 U.S.C. 1869). This section provides in part that the Foundation may award such fellowships for scientific study or work " * * * at appropriate nonprofit American or nonprofit foreign institutions *selected by the recipient of such aid* * * *." [Emphasis supplied.] It is quite clear that the Congress intended that Foundation fellowships permit free choice of institution. Thus, as early as 1946 the subcommittee report of the Committee on Military Affairs, in commenting on proposed legislation to set up a Science Foundation, stated that "It will be noted that these financial aids to study are to be given to individuals rather than to institutions; it is intended that the individual be permitted to study at a recognized institution of his own choice." This expression of intent was carried forward in subsequent committee reports.

I should further mention that the original language of the NSF Act provided that a fellowship would be given for study or work " * * * at accredited nonprofit American or nonprofit foreign institutions of higher education, selected by the recipient of such aid * * *." The change in the language of the section was effected on our recommendation in order to permit the choice of appropriate institutions other than degree-granting institutions. With this legislative background, we do not feel that we are free to require that tenure at a foreign institution be strictly limited to instances where the "training desired is best obtained in a foreign institution." We do feel, however, that we can be more insistent in requiring that the institution selected, whether in the United States or abroad, be appropriate for the particular work or study.

Accordingly, we propose, as soon as feasible, to require the applicant to give the name of his proposed scientific adviser and his reasons for choice of institution. We then propose to take into account in the evaluation process the appropriateness of the choice of institution to the proposed course of work or study of the applicant. In addition, we plan to pay travel allowances only for transportation on American-flag carriers where such service is reasonably available.

I hope that these actions will have a material effect on foreign expenditures under these postdoctoral fellowship programs. I do not believe, under our

present statutory authority, that we can go further in limiting the choice of institutions in these fellowship programs. I do wish, however, to express my desire to cooperate in every possible way in reducing expenditures abroad.

Sincerely yours,

LELAND J. HAWORTH, *Director*.

Mr. REUSS. So far as the file discloses, you never did anything about that. The National Science Foundation has cited a statute which to me is a very dubious authority indeed. So far as I know, you never asked the Attorney General or the Comptroller General for an opinion on that statute. Nor if the absurdity did turn out to be a fact—that by statute we were compelled to give foreign grants, even when the mission could effectively be accomplished at home—did you do anything, so far as I know, about coming up to Congress and asking that this absurdity be rectified?

Mr. ZWICK. Mr. Chairman, we did have additional discussions with the National Science Foundation. I am not in a position to give you the details of this discussion. I would suggest this might be an excellent one for me to spell out how we go from the general policy guidance to detailed discussions between the examiners and the agencies, and supply it to you at a later date.

Mr. REUSS. Well, it is a fact, is it not, that today, a year and a half after these letters, the National Science Foundation is still going ahead issuing these foreign grants where the education could as well be accomplished at home, and you are doing nothing about it. Is that not true?

Mr. ZWICK. As well at home—that it could be accomplished as well at home I think is the issue here. And I would say that I am not in a position to comment in detail on this specific. I would be happy to advise you of the specific information with regard to this.

Mr. REUSS. I wish you would.

(The information referred to is as follows:)

As indicated in Dr. Haworth's letter of August 13, 1964, the Foundation had some reservations about placing special limitations on overseas study by postdoctoral fellowship applicants. However, NSF proposed an alternative in the same letter. Specifically, Dr. Haworth said:

"With this legislative background, we do not feel that we are free to require that tenure at a foreign institution be strictly limited to instances where the 'training desired is best obtained in a foreign institution.' We do feel, however, that we can be more insistent in requiring that the institution selected, whether in the United States or abroad, be appropriate for the particular work or study.

"Accordingly, we propose as soon as feasible, to require the applicant to give the name of his proposed scientific adviser and his reasons for choice of institution. We then propose to take into account in the evaluation process the appropriateness of the choice of institution to the proposed course of work or study of the applicant."

On August 27, Mr. Staats, Deputy Director of the Bureau of the Budget, acknowledged Dr. Haworth's letter as follows (see attached letter):

The Foundation has in fact applied additional criteria in the review of both predoctoral and postdoctoral fellowship applications for overseas study, effectively holding down the number of such fellowships, especially at the predoctoral level.

EXECUTIVE OFFICE OF THE PRESIDENT,

BUREAU OF THE BUDGET,

Washington, D.C., August 27, 1964.

HON. LELAND J. HAWORTH,
Director, National Science Foundation,
Washington, D.C.

DEAR DR. HAWORTH: I appreciate your prompt attention to the matter of restricting postdoctoral fellowship awards for study in foreign countries and your continuing efforts to reduce expenditures abroad under other National Science Foundation programs.

I have considered the proposals, described in your letter of August 13, that greater consideration be given to the appropriateness of the institution selected by applicants in awarding postdoctoral fellowships and that travel allowances be restricted, where reasonable, to transportation on American-flag carriers. It would appear that these steps will enable further reduction in the Foundation's international transactions.

It is hoped that the actions proposed in your letter will be initiated as soon as possible.

Sincerely,

ELMER STAATS.

Dr. HORNIG. Mr. Chairman, may I comment on this. I cannot comment on the formal aspect of this problem. But I would note that the National Science Foundation postdoctoral fellowships are very heavily overapplied, very competitive, so that each of them is subjected to the most stringent review by an outside review panel as to the appropriateness of the plans of the individual and whether the institution selected for study is the appropriate one for the plans he has outlined. So that to some extent the restraint you desire is built into this selection procedure, whether or not it is mentioned specifically in the rules.

Mr. REUSS. Well, unfortunately, though, the letter I just read from the National Science Foundation says very specifically that it is no concern of theirs whether the education, postdoctoral education in that case, could be given as well at home. If the applicant wants to be abroad—they give him the grant abroad.

Dr. HORNIG. They give it to him abroad if the review committee decides that the institution he wants to study at, whether it be abroad or at home, is the most appropriate one to carry out this particular program.

I am simply saying this is the review procedure to which all applicants are routinely subjected, whether they apply to study abroad or at home.

Mr. REUSS. The letter of August 13, 1964, from the National Science Foundation, which I have read, which was the letter rejecting the Budget Bureau's suggestion of August 7, 1964, says:

We do not feel that we are free to require that tenure at a foreign institution be strictly limited to the instances where the training desired is best obtained in a foreign institution.

Thus spoke Director Haworth. If I understand the English language, that says that we are going to give grants even where the foreign institution is inferior to the U.S. institution. That's what that language says. And yet the Budget Bureau has allowed this practice to remain in effect, so far as I know, instead of getting the Attorney General's opinion the next day and rushing up to Congress to have that loophole, if it was such, closed.

Mr. ZWICK. Mr. Chairman, I said there were followups to that letter. I will have the details for you.

Mr. REUSS. Yes. We would welcome any details that can explain the fact that so far as the record shows there was silence and nothing done about it. And the final fact that these fellowships would violate the Budget Bureau's request of August 7, 1964, are still being made every day, here in February 1966.

I am informed, gentlemen, that there is a meeting of the President's Cabinet Committee on the Balance of Payments this afternoon, or

at least of its deputies. For this and other reasons I would not want to prevent your attendance. I do hope that at this meeting, as a matter of urgency, there will be brought out the thought expressed by various members of this subcommittee today, particularly Mr. St Germain, that there ought to be criteria issued by the President's Committee and by the Bureau of the Budget to the governmental scientific community governing research programs abroad. These criteria, then, could be tried on for size. They might state that before a project having a balance-of-payments impact is funded, it must be demonstrated to be important to the mission of the agency doing the funding; it would be against the national interest to postpone it for a time until our balance-of-payments situation improves; and it cannot be done effectively in the United States.

If these criteria which have been suggested by members of this committee be deemed defective, no doubt they could be improved on. But certainly they are better than no criteria.

In this connection, too, I would hope that the President's Committee would consider giving more guidance to the science agencies on specific grants. If the President's Committee will review the 20 or 30 grants mentioned at the last hearing, which specific grants will be made available to you, it does seem to me that you are likely to conclude that an undue drain on our balance of payments is occurring. I am thinking of the grant to a Canadian psychiatrist to write a history of psychiatry. I am sure he is a competent psychiatric historian. But I would think a little digging by the President's Committee would disclose that there are somewhere in the United States people capable of writing a competent history of psychiatry.

Therefore, I would hope that some review procedure would be set up on these projects.

I would also hope that the executive branch generally and the Bureau of the Budget in particular could give more support to those excellent foreign research projects which are financed by local currency. It so happens that I have been needling the Bureau of the Budget and the Department of State for more than 2 years now to come up and present before the proper appropriations committees of Congress explanations why many worthy science and research projects abroad which have been specifically suggested, and which would be financed by local currencies, are not being carried out—why the executive branch won't request authorization.

I am thinking of things like the marvelous cancer research proposal of the Chaim Weizmann Institute in Israel, which could be financed with Israeli pounds, of which we have a great surplus. I am thinking of things like the research hospital in Belgrade, Yugoslavia, for which dinars are available in large volume. But for some reason the executive branch simply won't come up before Mr. Rooney's subcommittee with specific, carefully thought out research proposals of this nature which could be conducted without any balance-of-payments impact. Instead, the Bureau of the Budget came up last year and just asked the Appropriations Committee for an \$82 million foreign currency allocation without saying what it would be for. As might have been expected, the Appropriations Committee very properly turned down that request.

If you look at the files, you will find a long series of correspondence from me urging and begging you to take up a number of listed and specified foreign science projects which could be conducted with local currency.

I say this lest it be felt that I am against international science. I am all for it. But I think we should take into account the balance-of-payments situation in which we find ourselves. By the application of sensible criteria we can cut down on the dollar-financed component of foreign research, instead of increasing it as we have in the last 4 years. We should also utilize to the full, which we are not now doing, the local currency components. I think we should also be a little more vigorous than we have been with other countries in trying to get them to assume primary responsibility for their own scientific establishment.

So I would hope that out of this exchange, which I assure you has been in a solid, constructive spirit by this subcommittee, may emerge some firmer guidelines and firmer policies which will make the task of our marvelous governmental scientific community a little easier.

I have the feeling, very frankly, that the fault is with us non-scientists—Congressmen, Treasury people, and Budget people—who have not bothered to give clear directives. We are the people who are supposed to know about balance of payments, not the scientists. I cannot be too critical of some of the grants that have been made in recent years because of the laxing of the guidelines—it is hard to say that they transcended those guidelines.

I welcome any further points of discussion that any of you gentlemen have.

If not, we are deeply appreciative of your coming here today.

At this point in the record, without objection, I wish to insert a letter from Dr. Frederick J. Stare, chairman, Department of Nutrition, Harvard University School of Public Health.

(The letter referred to follows:)

HARVARD UNIVERSITY,
SCHOOL OF PUBLIC HEALTH,
Boston, Mass., March 4, 1966.

MR. HENRY S. REUSS,
*Chairman, Research and Technical Programs Subcommittee,
Committee on Government Operations.*

GENTLEMEN: I appreciate the invitation from your chairman to submit a statement as a part of your hearings record on cooperative foreign research activities in biomedical research.

First, may I state that I was born and raised in a small country town in Wisconsin. I attended the University of Wisconsin at Madison from 1927–34 receiving the B.S., M.S., and Ph. D. degrees. I then was fortunate to have 3 years of postdoctorate research training, two of which were spent in Europe, divided between laboratories in England, Hungary, and Switzerland.

Returning to this country I worked for 2 years as a research biochemist at a cancer institute just opening at the University of Wisconsin. I then decided to attend medical school at the University of Chicago, receiving my M.D. degree in 1941. I spent 1 year as an intern in medicine at Barnes Hospital and in July 1942 I came to Harvard to organize and head a new department jointly between the school of medicine and the school of public health; namely, the department of nutrition. I have been the chairman of this department since its beginning in 1942 and professor of nutrition since 1947.

Because of the basic importance of nutrition to health, and the fact that people in many parts of the world are poorly nourished with resultant ill health, low industrial productivity, short life expectancy, and political instability, our department has had considerable experience in cooperative foreign researches.

A total of 59 research papers and reports dealing with cooperative foreign researches have come from our department in the past 20 years. The support of these researches has been in part from private funds, some foreign funds, and some Federal funds.

I should like to call your attention to a few specific researches. First, what is usually called the Ireland-Boston Heart Study or the Irish Brothers Study. It is a cooperative study between Trinity College School of Medicine and our department of nutrition. This is now in its fifth and final year.

This is a study where we attempt to neutralize the hereditary factors involved in coronary heart disease so we can more clearly delineate the effect of environmental factors such as diet, smoking and exercise habits, and mode of life. We are comparing pairs of blood brothers, both born in Ireland but one of whom has lived in the Greater Boston area for 10 or more years.

Death from heart disease is almost 100 percent more prevalent in people of Irish ancestry living in Boston as compared with Irishmen in Ireland. Why is this? Our findings emphasize the importance of physical activity and staying lean more than whether one consumes butter or margarine, many eggs or few, whole milk and skimmed. These studies have considerable practical importance to Americans, to you and to me. These researches began 7 years ago and for the first 2 years were completely supported by private funds. Five years ago a grant was obtained from the National Heart Institute that made it possible to continue and expand the studies. As I recall, this grant approximated \$65,000 per year. During this terminal year of the study the grant is \$87,636. Up until this year approximately half of the funds were spent in Ireland and half in Boston and for the terminal year our expenditures in Ireland will be about a fourth of the grant.

This study could not have been done in this country. The results are having, and will continue to have, great practical value to the health of Americans as well as all of mankind. It is an urgent project in the sense that most Americans will die of coronary heart disease.

A second specific example of a current cooperative foreign project we are engaged in deals with a study of a common disease of aging known as osteoporosis. This is a disease of bone and is responsible for many aches and pains in the back, hips, long bones of the leg, and for the ease with which they break when an elderly person has a fall. We have underway a project cooperative with the School of Medicine, Hebrew University, Jerusalem, Israel.

Osteoporosis is thought to be very prevalent in Israel. Israel is a country made up of many diverse groups of people, and all available in a small geographic area. We wish to get some idea of the variation of incidence of this disease among peoples of differing background, dietary habits, water sources, and physical activity. Israel appears to be the best country in which this can be done most efficiently. The results will be valuable to Americans.

As with our Ireland-Boston heart study, this study initially is completely supported by private funds, including some Israeli funds. If it appears promising I am certain we will make application to the National Institutes of Health for expansion and continuation for 5 years.

As a last specific example I would like to call attention to some researches we carried out in the National Penitentiary, Lima, Peru, on the minimum requirements of adult man for calcium. This research was published in 1952 and is generally thought of as the best piece of research in this area. It was supported by private funds from Harvard, government funds from Peru, and a very small grant (approximately \$5,000) from our foreign aid funds. It could not have been done in this country and the results have been of considerable practical value in planning diets for Americans and particularly for peoples in other parts of the world with very limited supplies of milk and cheese.

I could give many other examples of cooperative researches we have had in other parts of the world: Colombia, South America, Guatemala and Costa Rica; Jamaica; Nigeria; Thailand; Indonesia; India; Switzerland; Japan. Other high points of all of these researches have been the friendships developed between our researchers and our foreign colleagues and the opportunities they provide for the training and stimulation of Americans as well as non-Americans. I should also like to stress that most of our foreign research activities have been cooperative with some foreign university, hospital, or government agency, as for example the Ministry of Health in Peru.

When American funds were involved they were generally applied for by us, awarded to Harvard University, and expended in part by the employment of American or non-American scientists and the purchase of supplies and equipment in the foreign country where the research was underway. Generally there were coordinated researches underway in our laboratories in Boston. I think the results speak for themselves, and speak loud and clear to the advantage of the health of Americans as well as non-Americans.

The vitality of a technological society rests upon its scientists. Recent decades have been the most significant advances against disease in history. The dynamism of this effort is indicated by the tiny amount of our gross national product (approximately one-fourth of 1 percent) we invest in biomedical research. The rise in life expectancy, in good health, and the alleviation of human suffering attest to the wisdom of this investment. But there is more. Our country has had thrust upon it responsibilities throughout the world. These responsibilities are particularly pressing in the developing world, where many of the crucial problems relate to health.

There is the dilemma of an exploding population and a dwindling food supply associated with a host of nutritional and infectious diseases ever present to frustrate economic development. These are international health problems which we must alleviate to achieve our national goals for ourselves and our neighbors. President Johnson has said, "A healthy citizenry has traditionally been one of this country's foremost goals." I think most of us believe this comment. We certainly do when we are ill. I think most of us agree that health is certainly one of the foremost items in the action priorities of our country.

To act in accordance with the high priority placed upon health requires a vigorous and continuing program of biomedical research. The quintessence of worthwhile research is brainpower. Brainpower is an international commodity, not limited by political boundaries. Personally I feel the leaders of our national biomedical research effort have a moral obligation to take advantage of all resources available to them in securing the health of the American people. To find the brainpower required means inevitably searching beyond the limits of the United States. The recognition of this requirement has resulted in an international health research effort.

The National Institutes of Health of the Public Health Service has vigorously pursued many significant leads, no matter where or when, in carrying out their congressional mandate, and have thereby developed a program of biomedical research in which all Americans can take pride. An extensive study of the support of biomedical research by the National Institutes of Health was made by the Woolridge Committee for the President and released in February 1965. This Committee found:

"The opinion of the Committee, based on the extensive investigations of its consultants, is that the large majority of intramural and extramural research supported by the NIH is of high quality. We strongly approve the peer evaluation method of selecting recipients of extramural grants * * *. NIH supported work was found to set the national or international standard of excellence in its field."

Since ideas are the currency of science, one must invest this currency wherever it is found. It is impossible to predict in advance which new idea or which new approach will lead to significant findings. Moreover, scientists frequently are unable to perceive the need for certain information until its absence has already delayed or impeded further research.

Intellectual currency cannot be stored as a gold hoard, but must be invested; it accrues by usage, and the opportunity that is passed by may not come another day. Scientists cannot be placed in the vault and taken out at will, but rather must be continually worked to insure maximum productivity. This makes it difficult, and often impossible without great loss, to postpone projects or program research according to rigid a priori plans developed by externalized management exercising nonscientific criteria.

Research problems exist which can only be studied abroad or on an international basis. Many nutritional and infectious diseases are in this category. Some of these diseases, while not always present within the United States, are a constant and continuing threat. Their eradication is also essential to our efforts at assisting the developing countries. There are many unique opportunities because of special populations, climate, altitude, or laboratory facilities. Three

such studies from our own investigations I have referred to earlier. These studies, and many others I could have mentioned, could only have been carried out on an international basis. The results in most of these studies have been beneficial to the health of Americans as well as the rest of mankind that has access to them.

If good medicine is to flourish, good investigators must be supported wherever they work, at home or abroad. As a taxpayer and as a citizen, I hope that our international research and training activities will be expanded, that American researchers will be encouraged to develop cooperative activities with researchers in other parts of the world, and encouraged to invite some of the most talented young foreign investigators to their laboratories for training, supporting them with NIH training grants.

Health and science know no boundaries—geographical or political. Americans will be healthier, and our country stronger, if we encourage international research and training activities.

Respectfully yours,

FREDERICK J. STARE, M.D.,
Professor of Nutrition,
Chairman, Department of Nutrition.

The subcommittee will now stand adjourned until the call of the Chair.

(Whereupon, at 12:40 p.m., the subcommittee was recessed subject to the call of the Chair.)

APPENDIXES

APPENDIX I.—*Department of Defense statutory authority for foreign research grants (Public Law 85-934, Sept. 6, 1958; 42 U.S.C. 1891; 72 Stat. 1793)*

AN ACT To authorize the expenditure of funds through grants for support of scientific research, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the head of each agency of the Federal Government, authorized to enter into contracts for basic scientific research at nonprofit institutions of higher education, or at nonprofit organizations whose primary purpose is the conduct of scientific research, is hereby authorized, where it is deemed to be in furtherance of the objectives of the agency, to make grants to such institutions or organizations for the support of such basic scientific research.

SEC. 2. Authority to make grants or contracts for the conduct of basic or applied scientific research at nonprofit institutions of higher education, or at nonprofit organizations whose primary purpose is the conduct of scientific research, shall include discretionary authority, where it is deemed to be in furtherance of the objectives of the agency, to vest in such institutions or organizations, with out further obligation to the Government, or on such other terms and conditions as the agency deems appropriate, title to equipment purchased with such grant or contract funds.

SEC. 3. Each agency or department of the Federal Government exercising authority granted by this Act shall make an annual report on or before June 30th of each year to the appropriate committees of both Houses of Congress. Such report shall set forth therein, for the preceding year, the number of grants made pursuant to the authority provided in the first section of this Act, the dollar amount of such grants, and the institutions in which title to equipment was vested pursuant to section 2 of this Act.

APPENDIX II.—*National Aeronautics and Space Administration statutory authority for foreign research grants (Public Law 85-568, July 29, 1958; 42 U.S.C. 2473 (b) (5); 72 Stat. 429)*

Without regard to section 529 of title 31, to enter into and perform such contracts, leases, cooperative agreements, or other transactions as may be necessary in the conduct of its work and on such terms as may deem appropriate, with any agency or instrumentality of the United States or of any State, territory, or possession, or with any political subdivision thereof, or with any person, firm, association, corporation, or educational institution. To the maximum extent practicable and consistent with the accomplishment of the purpose of the chapter, such contracts, leases, agreements, and other transactions shall be allocated by the administrator in a manner which will enable small business concerns to participate equitably and proportionately in the conduct of the work of the administration.

APPENDIX III.—*A report of the International Committee of the Federal Council for Science and Technology, entitled "International Scientific and Technological Activities" (June 20, 1961)*

I. INTRODUCTION

Science and its applications in technology are exerting a revolutionary influence on the destinies of nations and mankind. Our domestic and foreign policies

must be attuned to this revolution and to its implications of change in the pattern of world relationships.

Not only does our domestic strength rely on a vigorous technological base: our Nation's role as a leader in the international scene will increasingly be determined by the accomplishments of our scientists and engineers in this country and by our contributions to the well-being of other societies.

When science is applied it can readily manifest itself in material power. But it has another and more subtle role. It possesses an objectivity which transcends differences in political and social systems—its language, its methods, and its ethics are universal. It can, therefore, be a powerful tool for building understanding among the peoples of the world and toward achieving eventual world cooperation.

These two potentials of science, which often lead to conflicting conclusions, are each significant factors in the formulation of policies to guide our international scientific and technological activities.

The growth of U.S. scientific and technological activities in other countries reflects their enlarged significance in our own national life. Today, all segments of the Nation's scientific and engineering community—professional societies, universities, foundations, industry, government—are engaged in activities abroad.

Because of the importance of these enterprises to the objectives of the United States, the International Committee of the Federal Council for Science and Technology initiated a study to assess our present efforts and to formulate guidelines and make recommendations for improving them.

Five aspects of international science activities were explored by separate task groups. Their reports are separately bound and should be consulted for a more detailed treatment of the subject. The areas covered by the task groups are:

1. International scientific organizations.
2. Support of research in foreign countries by U.S. agencies.
3. U.S. participation in international meetings and exchange of persons.
4. The image of U.S. science abroad.
5. Technological potential and capacity as a factor in technical assistance.

In each of these areas the role of Federal agencies was the primary concern. In certain of the studies, notably those pertaining to participation in international organizations, meetings, and the exchange of persons, the relevance of action by non-Federal agencies was recognized. It became clear that in most areas a national program which involves many elements of society outside of Government is necessary for more effective utilization of our professional resources.

These studies do not cover the full range of relevant international scientific activities nor do they purport to be definitive examinations of their respective areas.¹ This summary report is limited by the same qualifications.

The intent here is to provide a current assessment of what are considered to be significant aspects of international scientific activities as a basis for—

Clarifying principles and objectives as a contribution to understanding.

Setting forth guidelines for policy and action for agencies participating in the international scene.

Identifying new mechanisms and arrangements needed for more effective action.

The viewpoints, conclusions, and recommendations of these documents should be viewed as a current hypothesis or framework within which to plan, undertake, or evaluate U.S. international science activities, both governmental and nongovernmental. They should be considered as explorative and indicative, to be modified or replaced as experience and sophistication develop.

This summary report was first drafted by a board of editors comprised of representatives from each of the several task groups and was further edited after discussions in the international committee. Although the individual task group studies provided the substance, they did not necessarily set the terms or the content of the report.

¹ In general, the studies of the five task forces were limited to science and technology per se. Elementary science education, technical training, and similar operations were not considered. These areas are extremely important to a comprehensive analysis, and it is recommended that they be included in future studies.

II. SUPPORT OF INTERNATIONAL RESEARCH AND DEVELOPMENT BY FEDERAL AGENCIES

The total U.S. effort in international science covers a broad spectrum of activities, ranging through participation in international organizations and their operations, the direct support of research abroad, training, exchanges of scientists, and a diversity of other relationships. Governmental agencies, foundation, voluntary organizations, industry, and scientific groups all participate. Some beginning attempts to measure the international activities of the Federal agencies have been undertaken: this section summarizes the main elements that have thus far been assembled. Although incomplete, it provides some sense of the nature and distribution of responsibilities in this area as a partial setting for the discussions that follow:

There are at least 10 Government agencies and departments engaged in 1 or more forms of international scientific activities. Each of them has initiated its programs relatively independently, based on its own statutory authorization and funding and its own criteria for the conduct of operations abroad, with the sole restriction that these programs be consistent with the best interests of the United States, i.e., executed with the approval of the Secretary of State. Thus the justification for these activities is tied to an agency's specific mission rather than to an overall U.S. science requirement or a country situation; and there has been little interagency planning.

Kinds of activity

The following table indicates on a functional basis that the international scientific activities of U.S. agencies may be classified broadly in five major categories:

1. Research support by contracts and grants-in-aid.
2. Educational activities (fellowships, scholarships, training, exchange of persons).
3. Evaluation studies of potential and facilities of other countries.
4. Research conducted directly in other countries by U.S. personnel (field programs).
5. Scientific information collection and dissemination.

The table indicates the type of agency activity but not the magnitude of the support because truly adequate data are not available. Although there is thus no figure which represents the total expenditure of the United States on all its international scientific activities, the National Science Foundation has estimated from a survey concerned with total R. & D. effort, that the United States spent about \$28 million abroad on basic research for fiscal year 1960. This figure does not include moneys spent on educational activities, the training of scientific manpower, and science information and dissemination.

U.S. agencies engaged in international scientific activities, fiscal year 1961

Agency	Grants and contract support	Educational activities ¹	Evaluation studies ²	Research field programs	Science information, collections, and disseminations
AEC.....	X.....	X.....			X
Agriculture.....	X.....	X.....		X.....	
Commerce.....	X.....	X.....		X.....	X
Department of Defense.....	X.....	X.....	X.....	X.....	X
Interior.....	X.....	X.....	X.....	X.....	X
NASA.....	X.....	X.....		X.....	X
HEW.....	X.....	X.....		X.....	X
NSF.....	X.....	X.....	X.....		X
State.....	X.....	X.....	X.....	X.....	
ICA.....	X.....	X.....	X.....	X.....	X

¹ This includes fellowships, scholarships, training, and exchange of persons.

² It is recognized that evaluation studies are conducted indirectly by any agency which has a foreign science program but only the direct programs are recorded here.

Amount of support

The rapid growth of several individual agency programs is indicative of the rate of expansion of U.S. support for international scientific activities. For example, the National Institutes of Health spent \$5 million on international

science programs of all forms for fiscal year 1959, \$8 million for fiscal year 1960, and for fiscal year 1961 will spend approximately \$15 million, plus \$3 million in a foreign currency program. The Contract Office of the Air Force in Brussels (EOARDC) which was established in 1952, issued 15 research contracts for \$250,000 in fiscal year 1953, and as of December 1960 was supporting 437 contracts and grants in 17 European countries with a value of approximately \$12 million. The Department of Agriculture since the initiation of the Public Law 480 foreign research program in 1958 has utilized funds totaling about \$15 million equivalent in foreign currency

Overseas offices

The complexity of these agencies' operations has stimulated their assigning representatives or establishing science offices overseas, for example:

Agency and location

AEC, Buenos Aires, Brussels, Chalk River, Paris, Tokyo.

DOD: Army, Frankfurt, Tokyo; Navy, London; Air Force, Brussels.

Agriculture, Rome, New Delhi.

NSF, Tokyo.

NASA, Canberra.

Method of operations

Activities in international science may be executed in any one of the following ways:

1. Nongovernmental channels, such as university-to-university contracts, the National Academy of Sciences, or professional societies.

2. Bilateral governmental agreements, such as the Atomic Energy Commission's agreements for cooperation with 38 countries.

3. Multilateral channels involving international organizations which deal primarily with special fields, such as International Atomic Energy Agency, Euratom, World Health Organization, World Meteorological Organization, Food and Agriculture Organization.

4. Multilateral governmental organizations in which the science program is one of many, such as UNESCO, NATO, OECD, OAS, CENTO, and SEATO.

5. Nongovernmental international scientific organizations, such as International Council for Scientific Unions and its unions (e.g., International Union for Pure and Applied Physics, etc.).

Selection of one of the foregoing channels is usually made on the basis of any agency's responsibilities and the attendant circumstances rather than on overall considerations which involve both the science and the foreign policy aspects.

III. REASONS FOR U.S. INVOLVEMENT IN INTERNATIONAL SCIENCE

The foregoing review of the international scientific and technological activities of U.S. agencies conveys their scope and diversity. The growth and magnitude of these programs demonstrates that they are regarded as important to U.S. interests: their diversity reflects the variety of interests and motivations which support them. A comprehension of the essential nature of these determining influences is prerequisite to the formulation of sound government policy.

Two sets of considerations are involved—the scientific and the motivational.

Scientific considerations

The national commitment to the growth, support and furtherance of a major national scientific effort demands acceptance of a broad range of international relationships. The following reasons are paramount:

Science is a unity.—Science is the inquiry into nature. Its limits are the universe and the capability of the human mind. It possesses a unity, universality and independence which make it truly supranational in character.

This cohesive force in the scientific community can be facilitated or retarded by national policies, attitudes, and mechanisms. Because of its fundamental relationship to the vigor and productivity of a national scientific community, it is wise public policy to encourage and support extensive international relationships for scientists and for scientific institutions.

Scientific excellence is dispersed.—Scientific excellence is not an exclusive national possession. The talents and capabilities of scientists and institutions in other lands constitute a valuable resource with which we must be associated.

The geography of phenomena is global.—Major areas of scientific inquiry, such as oceanography, geophysics, meteorology, and astrophysics, take meaningful form only on a broad regional, global or universal term. A framework of international relationships is essential to national interest and development in these areas of study.

Unique opportunities must be exploited.—In various parts of the world there are natural conditions, special circumstances, and unusual materials of scientific interest which are significantly different from what is available within the borders of any single country. Research in such areas is imperative to scientific advance.

Motivational considerations

The advancement of science and our national welfare in both domestic and international affairs are compelling reasons for this Nation's engaging in international scientific undertakings. The nature of the national interest in supporting and conducting scientific activities beyond our borders is often inadequately identified and is frequently confused. Clear understanding of our objectives is an essential condition for realizing the benefits offered by international scientific activities.

Furthering U.S. foreign policy.—Scientific enterprises present exceptional opportunities to enhance the prestige, leadership and influence of the United States. Science provides a basis of common understanding and a means of cooperation for the advancement of knowledge and for its practical application. Thus our science activities can exert a profound influence upon the actions and attitudes of other peoples and nations toward the United States.

Strengthening the security of the United States and the free world.—Scientific and technological capability is a necessary base of military strength. International activity in this area, especially with our allies, is required in the interests of common defense.

Enhancing domestic programs in technical areas.—Most of our scientific and technological capability is engaged on technical problems related to the national welfare. Such activity requires participation in and close relationships with the world stream of related professional endeavor. Through support of research and training, participation in international organizations and other collaborative ventures, the products of foreign science can add materially to the quality and productivity of our own.

Advancing the status of science generally.—Beyond the role of scientific and technological activity in the achievement of foreign policy goals, of security, and of national progress, is the need and obligation to advance the status of science for its own purposes of enlarging man's knowledge and understanding. Its furtherance involves acceptance of responsibility to support basic science, to improve the framework of international relationships, to reduce the obstacles to scientific communication and exchange, and to provide for a more effective voice for science and its values in the affairs of men and nations.

In summary terms, the reasons for U.S. investment in international scientific activities derive from the intrinsic character of science itself and from the major role that science and technology must play in achieving this Nation's objectives. A fundamental problem may be encountered here: the supranational values of science may at times appear to be in conflict with current foreign policy. The resolution of such seeming conflicts when they appear calls for statesmanship of a high order.

IV. GUIDELINES FOR POLICY AND ACTION

The United States, through governmental and nongovernmental agencies, institutions, and individuals, participates in a wide range of international undertakings related to science and technology. The areas of activity which were considered in the separate studies which underlie this report are.

1. Participation in international organizations and meetings.
2. The support of research abroad.
3. The exchange of persons.
4. Science and technology in technical assistance.
5. The image of U.S. science abroad.

Each of these topics presents a series of individual problems and considerations which the separate task groups examined in detail. The conclusions and recommendations derived from their studies, as modified by discussions of the international committee, are suggested in this section of the report as guidelines for national policy and action.

In the process of review and discussion, however, certain general considerations which relate broadly to most phases of our international scientific activity have emerged. These are given first:

Multilateral and bilateral forms of activity.—In general, U.S. international scientific activity should be carried out in a manner which strengthens and furthers the concept of international collaboration and cooperation on a multilateral basis. This involves support and close relationships with international scientific and technical organizations of a nongovernmental nature. In like manner, the United States should participate actively in the affairs of regional and international technical agencies of governments.

Nongovernmental international scientific activity.—The role of nongovernmental organizations and enterprises in international science is important. Especially the potentialities of the National Academy of Sciences and of other national scientific bodies should be better recognized and encouraged by Government agencies, notably by the Department of State.

Clarity and distinction of objectives.—A distinction between Federal agency international operations which are fundamentally a natural expansion of its domestic activity and those which are initiated primarily for support of foreign policy will help to clarify objectives and to permit proper decisions as to methods and budgeting.

A. The support of research abroad²

Federal obligations in fiscal year 1960 for the conduct of basic research in foreign countries are estimated by the National Science Foundation to total \$28 million or about 4 percent of our domestic support. Expenditures of this magnitude present complex issues as to the reasons for such programs, the policies and procedures under which they are conducted, and their effects within the recipient countries. These problems become of particular importance in considering the need, the opportunity, and the desirability of further expansions.

In general, the direct support of research abroad by U.S. agencies is justified for:

Technical or scientific reasons in circumstances where (a) unique opportunities or exceptional capabilities for research and training are offered; (b) U.S. resources in manpower and facilities can be effectively supplemented; (c) the role of an international agency is required.

Foreign policy purposes in circumstances where (a) the quality of science, of particular fields of science, or of the community of scientists and scientific institutions within a country can be strengthened; (b) major problems impeding social, economic, or political development of a country may be solved or ameliorated; (c) the economic and military capability of the United States and its allies can be strengthened in the interest of common defense.

Specific guidelines relating to the support of research abroad by U.S. agencies follow:

United States versus indigenous support of research.—U.S. support activities should be carried out in a manner which encourages the recipient countries to assume increasing responsibility for the support of their own science and the enhancement of their own professional resources.

In areas of common scientific interests and in nations of clear economic capability, U.S. programs should encourage collaborative arrangements providing for joint support.

U.S. research support in foreign countries generally should be viewed as limited in duration and character, determined by the nature of U.S. needs and objectives and the changing circumstances of the recipient countries. Long-term commitments which cannot be relinquished without resentment or disruption should be avoided.

Effects of U.S. support upon foreign science.—Large-scale research support from the United States can affect for good or for ill, the structure, the vigor, and the direction of scientific development within a country. Our actions should aim to assist talented teachers and research people, and especially to reduce the tendency for them to leave their country for permanent residence abroad by encouraging the development of excellence in local institutions.

Support of United States versus foreign science.—U.S. support for research directed overseas should be evaluated in relation to our support of domestic research to avoid penalizing the development of U.S. science in the same field. The judgment requires more adequate data than are now available.

² Task force study B.

Foreign policy effects of U.S. support.—Our research activities abroad are, on the whole, highly valuable contributions to U.S. foreign policy interests. In some instances, however, a specific program, or the nature of the Agency support, may be undesirable for foreign policy reasons. It is therefore essential that State Department approval be secured before a program is initiated or significantly expanded.

Research support by the military.—The support of research relevant to its mission is a valid and appropriate role for the Department of Defense. However, research support in foreign countries by U.S. military agencies has been, and still is, a matter of some sensitivity and difference of opinion. Particular care should therefore be exercised in such undertakings and in assessing their effects.

Necessary improvements.—The review of major issues involved in our support of research in foreign countries has pointed up inadequacies in existing arrangements, mechanisms, and assignments of responsibility. Better coordination and leadership could do much to strengthen overall effort. A series of major recommendations to provide for needed mechanisms and relationships for improving the general direction and coordination of U.S. international scientific activities, as well as for research support programs, are set forth in section V of this report.

*B. Participation in International Scientific and Technical Organizations*³

Participation in the programs and in the direction of international professional organizations offers a prime opportunity for the United States to strengthen its science and technology, build friendly relations with other nations, and support the concept that such international associations are a significant constructive force in a divided world.

U.S. participation in such activities has been growing rapidly. It is estimated that between 15,000 and 20,000 U.S. scientists and engineers attend 2,000 such meetings each year. Here they can have personal contact with some 100,000 of their colleagues from other countries. The opportunities to portray a true impression of the United States through these natural and competent representatives are real and widespread. Mechanisms by which Government might assist to make these opportunities more fruitful are outlined later in this section.

A second significant opportunity is to host important meetings of international scientific organizations in the United States. Since 1951, only 5 (and since 1953, 3) general assemblies and congresses of the International Council of Scientific Unions and its 13 constituent scientific units have been held in this country, as compared to 4 in Canada and 37 in Western Europe. This poor showing is partly due to high costs of travel but our visa requirements and our policies on representation from unrecognized regimes have been major deterrents. Such a record is not consistent with a position of scientific leadership, and it substantially impairs the image of U.S. science abroad.

Two general guidelines for Government policy concerning international scientific and technical organizations and meetings follow:

1. *Participation is important.*—U.S. participation in the affairs of international scientific organizations and in their meetings is of basic importance to the progress of the Nation's science and to our scientific prestige. Securing the benefits from such activities requires planning and followup, as well as actual participation at meetings.

2. *Meetings in the United States.*—A larger fraction of the important international meetings on science and technology should be held in this country. The attitude of Government should become one of encouragement and positive support, including financing as necessary.

The following suggestions are advanced as aids in implementing these guidelines:

(a) The State Department or the President might issue a policy statement to pertinent Government agencies on the importance of effective U.S. participation in international professional organizations. This statement could also set the stage for improvements in restrictive legislation and administrative practices.

(b) The National Academy of Sciences, in its role of nongovernmental scientific leadership, might be asked and funded from Federal sources to: (1) Organize and conduct a periodic national conference of key professional lead-

³ Task force studies A and C.

ers from within and outside Government to develop policies and support for stronger international participation, (2) arrange for a Standing Committee of the Conference which would keep itself currently informed and advisory to both Government and non-Government groups, and (3) provide a small secretariat to serve the needs of the Conference and its Committee, to provide information to U.S. professional groups and Government agencies, and to assist communications with headquarters of the important international organizations.

Science in intergovernmental agencies.—This section has dealt so far primarily with nongovernmental international organizations such as the scientific unions on Pure and Applied Chemistry (IUPAC), and on Pure and Applied Physics (IUPAP). Intergovernmental organizations—e.g., UNESCO, World Health (WHO), the International Atomic Energy Agency—have science components which require sound technical backup for our official representatives to the organizations. The overall responsibility for instructing and supporting our representatives to these organizations rests with the Department of State, but State may well need assistance from qualified sources on scientific matters. This technical backup has been adequate in some cases but deficient in others.

Organizations whose mission is primarily scientific or technical should be backed up by the agency with a corresponding mission, e.g., IAEA by the Atomic Energy Commission, WHO by the Department of Health, Education, and Welfare, and FAO by the Departments of Agriculture and of the Interior.

In some intergovernmental organizations the science component is only one of many interests—e.g., in UNESCO, NATO, OECD, OAS—and the technical aspects may spread over many fields. The Office of the Science Adviser in State should insure that there is adequate support for their science components, calling upon competent technical agencies, especially the National Science Foundation, to play an active role.

U.S. participation in the management and direction of intergovernmental organizations.—The International Committee of the Federal Council should arrange for reviews of the activities of important international scientific organizations to determine the need and value of furthering U.S. participation in the management and staffing of these organizations, including the provision by the United States of top management and secretariat personnel where proper. Agencies of Government should stimulate the interest of leading U.S. scientists and engineers in service in such intergovernmental organizations in order that the State Department and the relevant agencies may develop qualified candidates for these positions.

C. *The exchange of scientists and engineers*⁴

The exchange⁵ of scientists and engineers is a valuable device for strengthening science as well as for furthering long-range foreign policy objectives through developing mutual understanding by close, informal person-to-person associations between U.S. scientists and their fellows abroad. Exchanges with the lesser developed nations are especially helpful in establishing science and technology as one basis for national self-sufficiency and internal stability.

In order to improve the process of exchange of scientists and engineers, the following guidelines are proposed:

General.—Exchanges where the primary purpose is furtherance of scientific communication and personal understanding should be vigorously cultivated as a significant factor in furthering the concept of an "Open World." Interference for short-term political reasons should be minimized.

Exchanges for technical assistance purposes.—U.S. contributions of educational and scientific assistance to the lesser developed nations must be greatly increased. Exchanges of scientists and engineers should be guided by policies which involve the political and economic considerations pertinent to the area.

Need for competence and adequate duration of stay.—A primary consideration in the selection of individuals who will be encouraged to participate in exchange programs is to secure persons with the highest levels of competence for the

⁴ Task force study C.

⁵ "Exchange" in this discussion means the free movement of scientists amongst countries for study, teaching, research, and the general exchange of knowledge rather than the quid pro quo relationship characteristic of the United States-U.S.S.R. agreement. The problems of exchanges with the Soviet bloc have not been covered in the task group studies thus far. However, in principle the U.S.S.R.-U.S.A. exchange program should be consistent with the guidelines presented herein where considerations of a political or security nature permit.

tasks involved. Programing should provide for exchanges of adequate duration to maximize the likelihood of significant and lasting results.

Coordination of exchange activities.—While central direction of the exchange programs is undesirable, coordination is essential. The National Science Foundation should assist the State Department by collecting, analyzing, and disseminating data on exchanges for the purpose of improving the effectiveness of the programs.

Each agency with special competencies should be enabled to administer exchange programs directly relevant to its interests.

Action by Federal agencies.—Federal departments and agencies should stimulate increased participation of U.S. scientists in international exchange programs related to their technical areas of interest for the purpose of providing U.S. scientists with a firsthand acquaintance, knowledge, and understanding of foreign problems and peoples.

*D. Science and Technology in Technical Assistance*⁶

Technical assistance comprises measures, short of the provision of significant capital, undertaken by a technically advanced country to improve the human and institutional resources and capabilities of another country.

The primary purpose of our technical assistance programs is to assist other nations or societies in solving immediate problems and, even more, to facilitate their economic, political, and social development into free and viable communities in a modern world. While our programs to date are proving notably successful in some areas, the results of much effort and expenditures in many others have been disappointing. Basically, we know too little about—

The nature of change in societies, and its dependence and effects upon individuals.

Effective communication of skills and ideas between different societies and cultures.

The usefulness of particular technologies in the different cultures.

Although the need has been great and the potential for significant contributions manifold, there has been no significant provision in the past for research and development in the area of technical assistance. Overcoming this grave inadequacy is imperative.

Research and development can make significant contributions:

In the attack upon country problems.—The scientific investigation of major problems, both longstanding and emergent, which impede the social and economic growth of developing nations can lead to strengthening the basic resources of a country and its people.

In adapting technologies.—Much of the advanced technology of a modern nation must be adapted and simplified if it is to be useful in developing countries. Indeed, new technologies to fit the different circumstances of available energy sources, economic and social patterns, and environment must be developed.

In improving the policies and practices of technical assistance.—Research and development can enlarge the body of knowledge and skill which bears upon the successful conduct of technical assistance programs per se. The whole spectrum of the natural social, and behavioral sciences should be utilized to comprehend the nature of change and transition in developing areas and to appraise the probable effectiveness of assistance proposals.

In the light of these objectives and opportunities the following actions are proposed:

Research and development function in technical assistance.—A clear role for research and development in the conduct of technical assistance programs should be included in the organization of the new development assistance agency. The new section should be responsible for initiating and directing the kinds of activities described above, making maximum practicable use of the competence of other agencies of Government and the private sector by fund transfers and grants.

Continuing evaluation of technical assistance.—It is important that provision for the continuing scientific evaluation of all important technical assistance activities, with feedback of the knowledge gained into the operational stream, be incorporated in the functions of the new section.

Need for short-term studies.—While it is clear that the major problems involved in technical assistance must be studied in their long-term context, it is not wise to wait for the completion of these studies before attempting to

⁶ Task force study E.

strengthen the current activity. Short-term studies should be encouraged to assure that current technical assistance efforts will realize as much of their potential as possible.

Evaluation of participant training.—Strong support for the continuing worldwide evaluation of all aspects of participant training should be provided.

Relationships between the new aid agency and the participating agencies.—Careful consideration should be given to the relationship between, and the respective functions of, the new aid agency and the many Federal Government agencies which engage in, or are associated with, technical assistance activities. The competence of the other agencies should be fully utilized.

Evaluation of U.S. resources for technical assistance programs.—The new section should undertake immediately a study of the probable long-term demands of Government and other aid programs on the American community. This study should be concerned not only with a projection of needs in terms of numbers and classes of people for actual service overseas. It should include an appraisal of requirements such as those on universities and industries for the training of participants and of our resources for carrying on the needed research. It should also delineate the kind of relationships which should be established between the Government and the various sectors of the private community if these needs are to be met. This will almost certainly involve fundamental adjustments to meet new conditions.

*E. The image of U.S. science abroad*⁷

U.S. science has made remarkable progress in the past decade. Yet, since the advent of Sputnik I, the image of U.S. science abroad has not kept pace with that of the U.S.S.R. The April 1961 Soviet man-in-space accomplishment had a further tremendous negative impact on the relative position of the U.S. image. On the other hand, the effect of the May 5 flight of Astronaut Shepard, especially the openness with which it was done, was an important positive factor in the image trend. Major causes of the deterioration are:

1. Soviet successes in space.
2. A confused domestic image of U.S. science.
3. A lack of understanding in this country of the importance of a proper image of U.S. science abroad.
4. A lack of an overall national program for developing and projecting a sharp image of U.S. science.
5. The inadequacy of personnel, in number and in quality, for reporting and interpreting science for the various audience levels at home and abroad.

The participation of the United States in international scientific activities has been expanding; but, except for a few isolated instances, the participation has not been directed toward image objectives. Because of the importance of science in the formulation of world public opinion, it is essential that positive action be taken to reverse the deterioration in our position abroad.

U.S. science image must be improved.—An overall national program for sharpening the image of U.S. science is necessary. The program should meet these requirements: (a) continued strengthening of U.S. science itself, (b) development of a positive image of U.S. science for projection at home and abroad, (c) cultivation of a better appreciation of the need for a proper image of U.S. science at home and abroad, (d) training of personnel for transmitting and interpreting U.S. science for different audiences, (e) acquisition and interpretation of significant data on the mechanism of image formation and alteration, including the effects of various activities on different elements of the foreign audience.

Nature of the desirable image.—This is the true image, and the one which we should project abroad: U.S. science is broad yet balanced, diverse yet dynamic, open and free, international, and dedicated to man's welfare.

As initial steps in the development of a national program for the sharpening of this image of U.S. science, the following arrangements and mechanisms are proposed:

USIA has a primary role.—Leadership for the development of the overall national program directed toward the improvement of the image of U.S. science in world public opinion should be assigned to the USIA, with provision of adequate funds and an increase in the number of scientific information specialists in USIA.⁸ Other agencies and departments of Government should cooperate in emphasizing the true image of U.S. science through their programs.

⁷ Task force study D.

⁸ This is the subject of the first recommendation of the Sprague report.

Recognition within Government.—The USIA and the Department of State should undertake an educational program for executives, scientists, and information officers of the scientific and technical agencies of the Government to increase their familiarity with the problems of the U.S. scientific image abroad and its relationship to U.S. foreign policy.

Better science reporting.—NSF should continue and expand its efforts to raise the level of U.S. science reporting and interpreting, and stimulate scientific and professional organizations to support similar activities.

Study of image formation.—The USIA should undertake on a priority basis a program to increase the knowledge of image formation and alteration as they relate to U.S. science.

A continuing responsibility.—The International Committee of the Federal Council for Science and Technology should be assigned the continuing function of examining the problems of the U.S. science image and serving as a medium for intercommunication, for coordinating efforts, and for stimulating the effective presentation of the true picture of U.S. science.

V. THE CONCLUDING VIEW AND RECOMMENDATIONS

In summary this discussion of major aspects of U.S. scientific and technological activities beyond our own borders has portrayed their diversity, their complexity, and their impact upon the furtherance of our national aims in both domestic and international terms. It has revealed evident needs for:

1. Clarity in our objectives and in the arrangements for attaining them.
2. Adequate coordination amongst Government agencies and with nongovernmental groups.
3. Acceleration of many activities.
4. Initiation of new undertakings to fill gaps.
5. A coordinated series of guidelines for international activities.

Section IV has presented guidelines for policy and action which, for the most part, relate rather specifically to the individual subjects discussed. It is clear, however, that beyond these specific actions, there is need for broader mechanisms for strengthening our international scientific and technological activities in support of U.S. objectives. Further steps to this end include:

1. *Better information on what we are doing.*—The National Science Foundation should expand its general program of collecting data on U.S. science activities to identify the magnitude, character, and distribution of the overseas scientific and technological activities of U.S. public and private agencies. This would provide data for planning, for evaluation, and for policy. Further, the NSF should collaborate with the State Department in developing information about the local arrangements in foreign countries for their own conduct and support of science and about the impact of U.S. scientific activities there upon these indigenous arrangements.

2. *Foreign policy evaluation.*—The operation of a specific U.S. science program might have unfavorable effects on foreign relations in some parts of the world. The State Department, with its overall responsibility for foreign policy, must be the judge in such cases, after appropriate consultation with the agency involved. In turn, State should actively encourage the extension of agency operations abroad where it believes that benefits to our foreign policy objectives would accrue.

3. *Operational evaluation.*—Evaluation of the scientific and technological aspects of the foreign activities of U.S. agencies should be carried out by the Federal Council for Science and Technology through its International Committee. Recommendations for actions of a major nature could, if necessary, be brought to the President by the Chairman of the Council.

4. *U.S. scientific missions overseas.*—Consideration should be given to establishing on a carefully selected basis integrated U.S. scientific missions on a country or area basis under the general policy direction of a science officer responsible to the State Department. These missions would include the personnel from each agency whose science interests in the area would require such representation. The individual agency representatives would be directly responsible to their parent organizations in the United States on scientific program matters. General scientific activities serving all agency programs, such as science information, should be carried out on a unified basis to the extent that this is feasible.

5. *Science and technology in technical assistance.*—We understand that the proposed development assistance agency provides for a specific organizational component to foster and fund research leading to more effective techniques

for selecting and administering development assistance operations. This accords with the recommendations of our Task Force on Science and Technology in Technical Assistance. It has our hearty endorsement.

6. *On international role for NSF.*—The role and responsibilities of the National Science Foundation to foster the development of U.S. science should be expanded to include similar functions in foreign areas where the Secretary of State judges that it would be advantageous to our national interests.

7. *Federal Council for Science and Technology and its International Committees.*—An important responsibility of the Federal Council for Science and Technology is to coordinate the international scientific and technological activities of all Federal agencies to assure their greater contribution to national objectives. It now seems timely to enlist assistance from non-Federal groups with international interests and experience, e.g., the National Academy and others, to participate as observers in pertinent meetings of the International Committee of the Council.

8. *The science post in the State Department.*—The conclusions and recommendations of this report would place greater responsibilities in the Office of the State Department's Science Adviser. This increased role should be reflected in an expanded staff for the Office, both overseas and at home, and the fullest possible liaison with other sections of the State Department and with other agencies.

In conclusion, it should again be emphasized that the guidelines of this report are tentative. The next step is to test their usefulness and validity by applying them to specific cases, and thus to learn whether and what modifications may be desirable. Each member of the Federal Council can be helpful by having his agency apply to its own activities the tests of the guidance as here presented. Reports by the agency representatives to the International Committee on the results of such agency testing would contribute significantly to the process of establishing workable understandings for more effective operations.

APPENDIX IV.—*Bureau of the Budget Circular A-58 relating to estimates and reports on international transactions (July 7, 1964)*

To the heads of executive departments and establishments.

Subject: Estimates and reports on international transactions.

1. *Purpose.*—This circular sets forth policies and revised procedures for continuation of the system for reviewing and controlling international transactions of the Federal Government, to provide a means for improving the U.S. balance-of-payments situation. This revision provides some modifications in the system of estimates and reports to relate the figures for completed periods in submissions under this circular to the data reported to the Department of Commerce under Bureau of the Budget Circular A-65. This revision supersedes and replaces Circular A-58 dated December 9, 1963.

Instructions for the preparation of detailed schedules have been revised to:

(a) Combine, in line A-1b of schedule I, amounts deducted from employees' pay and other amounts collected from employees which flow through the accounting records of the agency concerned, and report separately, on line A-1c of schedule I, estimated amounts which are returned to the United States through nongovernmental channels. The new line A-1c will represent a difference between figures used in the official balance-of-payments statistics and the net amount reported under this circular.

(b) Combine, in line A-2a of schedule I, purchases of goods and services for construction abroad with other purchases of goods and services for programs abroad, and exclude from the reports and estimates expenditures in the United States for goods and services to be delivered in the United States.

(c) Eliminate the separate reporting of individual Western European countries on schedule II. A single total for Western Europe will be required in future reports.

2. *Agency coverage.*—Each agency which has transactions abroad (either receipts or payments) totaling \$1 million or more per year is subject to the requirements of this circular. Agencies with transactions abroad of less than \$1 million per year are excepted from all requirements of the circular except the policies set forth in section 3.

3. *Policies on payments and receipts.*—The head of each agency will be responsible for taking all possible steps for his agency to minimize payments and maximize receipts entering into the balance of payments, in accordance with the following policies:

(a) Each agency will review its requirements for conducting activities abroad, with a view to terminating these activities, consolidating them, or restricting their scope, wherever this can be done without damage to the national interest, even though it may result in additional budgetary costs.

(b) Each agency will review those activities in which there is cost sharing by other countries, with a view to negotiating the assumption by other countries of a larger share of common and joint costs wherever this can be done without damage to the national interest.

(c) With respect to procurement of equipment, materials, and supplies abroad, agencies will follow announced policies or such special instructions as may have been issued for each agency.

(d) Each agency will establish administrative policies and controls as necessary to keep payments abroad to a minimum. Such policies and controls should be applied to the use of funds made available through contracts, grants, and fellowships, as well as to direct expenditures. Particular attention should be given to limiting oversea travel to the minimum necessary to accomplish the agency's program.

(e) Every effort should be made to maximize, as a substitute for dollars, the use of foreign currencies which the Treasury Department has determined to be excess, in incurring obligations and making payments for contracts, services, wages, pensions and other benefits, and procurement. Necessary activities overseas should be located in excess-currency countries (in preference to other countries) to the maximum extent possible.

In addition, the head of the agency will recommend such steps as he deems appropriate which are beyond his responsibility to effectuate.

4. *Management and control system.*—Each agency head will see that the system of estimates, reports, and controls prescribed herein is an essential part of his system of management. He is expected to see that responsibilities for all aspects of this area of management are clearly defined and well understood within his agency.

Estimates of future transactions should be prepared with due regard to program developments and the policies of this circular. It should be noted that the estimates required are not intended to be forecasts or projections of what will happen if present practices continue. Instead, the estimates are to be plans of what the agency head will attempt to bring about by changing present practices in accordance with Government policy where necessary.

While it is not required that each agency have accounting segregation of the transactions reportable hereunder, the system should provide complete, accurate, and reliable information on a timely basis, and, to the extent feasible, establish controls to assure compliance with approved estimates.

5. *Targets.*—The agency estimates (of both payments and receipts) for each fiscal year (except past years) will be considered as tentative targets for minimizing expenditures and maximizing receipts for that year. Where practicable, the targets for the agency as a whole should be subdivided into targets for major organization units, so that officials responsible for those units may be made responsible for assisting in the achievement of the targets.

Revisions of targets may be requested by the agency in subsequent submissions and must be fully justified. In particular, in any case where a revision of the target is requested in the submission on March 15 of the fiscal year to which it applies, the differences between the actual figures for the first 6 months of the year and the previous estimates for that period must be explained in detail. If the estimates for the first 6 months were not met, and a revision of the target is not requested, the justification should indicate what steps have been taken to adjust activities in the last 6 months so as to meet the total for the year.

Agency proposals of original targets or subsequent revisions of targets will be considered to be approved unless the agency is notified otherwise by the Bureau of the Budget.

Whenever payments exceed the target for the year, or receipts are less than the target, the reason for the failure to achieve the target must be explained in the justification included in the September submission. When requested by the Bureau of the Budget, a special report explaining the circumstances involved

will be submitted by the head of the agency to the Bureau of the Budget for consideration by the President.

6. *Relationship to balance-of-payments statistics.*—The transactions to be estimated and reported relate primarily to payments and receipts which affect the balance of payments and must be consistent with, or reconciled to, the data reported to the Balance of Payments Division of the Department of Commerce under Bureau of the Budget Circular No. A-65. While the coverage basically relates to the Government sector of the balance-of-payments statistics, provision is also made for reflecting in the schedules certain related transactions and the effect of Government actions on certain transactions which are actually in the private sector.

Questions with respect to the concepts of the balance-of-payments statistics may be taken up with representatives of the Balance of Payments Division of the Department of Commerce. Unresolved issues with respect to such concepts should be brought to the attention of the Bureau of the Budget.

The Department of Commerce will assist the Bureau of the Budget in the technical appraisal of the "actual" data being reported, including the application of the knowledge it gains from other sources. When appropriate, an agency may be asked to reconsider its data if its methods or reported results seem technically questionable.

7. *Assignment of liaison officer.*—The head of each agency subject to the requirements of this circular is requested to assign a liaison officer to coordinate balance-of-payments reporting for the agency. The Bureau of the Budget and the Balance of Payments Division, Department of Commerce, should be advised of the name of the person so assigned and of any subsequent changes in this assignment.

8. *Agency submissions.*—Schedules and justifications prepared in accordance with the instructions set forth in the attachments to this circular will be submitted to the Bureau of the Budget by March 15 and September 15 of each year. All transactions of any agency will be consolidated in a single set of schedules, unless separate reporting of certain transactions is specifically requested by the Bureau of the Budget.

Twenty-five copies of the schedules and five copies of the justifications will be required. In addition, one set of the schedules and justifications will be provided directly to the Balance of Payments Division (BE-50), Department of Commerce, at the same time the submissions are forwarded to the Bureau of the Budget.

In addition, a narrative statement on developments and issues will be submitted by June 15 and December 15, whenever (a) developments since the last submission would significantly affect the data in that submission; (b) problems were identified for exploration or for action in the course of the preceding review; (c) new problems not previously discussed have arisen; or (d) there are any other developments which the agency believes should be reported. Whenever possible, specific dollar amounts should be noted and related to the previous submission. Five copies of these statements will be required.

9. *Central consideration.*—The agency submissions under this circular will be reviewed by the Bureau of the Budget in the same manner as budget and apportionment submissions. Agencies should be prepared to attend hearings and conferences and to discuss issues arising from their schedules and justifications. The Bureau of the Budget will consult with others, including the Treasury Department and the Council of Economic Advisers, during the course of these reviews, and from time to time, place the results of the reviews before a Cabinet committee and the President.

KERMIT GORDON, *Director.*

INSTRUCTIONS FOR PREPARING DETAILED SCHEDULES AND JUSTIFICATIONS ON INTERNATIONAL TRANSACTIONS

GENERAL INSTRUCTIONS FOR SCHEDULES

Coverage.—Each agency shall estimate and report all foreign transactions which are (1) chargeable to its appropriations and funds (including charges to allocations made to other agencies), and (2) credited to its appropriations and funds or to its receipt accounts. Foreign currency collections available for U.S. uses will be reported by the agency responsible for billing and collection, even though they are deposited to Treasury accounts. Transactions involving foreign currencies available only for loans or grants in the country concerned ("country use" currencies) will be excluded.

Format of schedules.—Schedules I and II, as illustrated in exhibits A and B, will be submitted on letter-size (8 by 10½ inch) sheets. Stub entries illustrated will be used to the extent applicable; entries not needed may be omitted, but those used must be numbered like the exhibits. Additional breakdowns may be used when desired, but should be identified by numbers or letters not on the exhibits.

The schedules submitted on March 15 will contain eight amount columns (illustrated on schedule I), headed as follows:

Fiscal year 19PY Total final	Fiscal year 19CY			Fiscal year 19BY			Fiscal year 19BY+1 Estimated
	July- December preliminary	January- June estimated	Total estimated	July- December estimated	January- June estimated	Total estimated	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

The schedules submitted on September 15 will contain seven amount columns (illustrated on schedule II), headed as follows:

Fiscal year 19PY			Fiscal year 19CY			Fiscal year 19BY estimated
July-December final	January-June preliminary	Total preliminary	July- December estimated	January-June estimated	Total estimated	
(1)	(2)	(3)	(4)	(5)	(6)	(7)

NOTE.—19PY designates the past fiscal year, 19CY the current fiscal year, 19BY the budget year, and 19BY+1 the year following the budget year.

Transactions to be reported.—All transactions between an agency of the U.S. Government and any foreign entity, government, business, or individual will be reported. In addition, contracts with U.S. nationals, firms, or institutions for services to be provided abroad will be included. Transactions between Government agencies will be excluded, except for payments to Commodity Credit Corporation for commodities bartered overseas.

Time reference.—Transactions should be reported as applicable to the period in which they occur, regardless of the time of entry on the accounts of the reporting agency. Generally, cash disbursements and collections should be reported. Where no cash exchange occurs, however, transactions should be reported as of the time of transfer of possession of goods or the actual performance of services.

Foreign currency transactions.—Transactions which arise in other currencies and are so accounted for will be translated into U.S. dollars. (Foreign currency collections which are immediately converted into dollars rather than being deposited to Treasury "FT" accounts will be reported as dollar collections.) The translation into dollars will be made at the Treasury "reporting rates" announced at the beginning of each quarter under Procedures Memorandum No. 1, Treasury Department Circular No. 930, revised. In cases where "agreement rates" are used in agency and Treasury reports, the amount of the difference will be shown in a footnote.

Schedule I

Payments and receipts affecting the balance of payments will be reported by type of transaction on schedule I, using the applicable entries as illustrated in exhibit A. Amounts will be entered as follows:

A. Payments

Item 1a. Gross pay—U.S. personnel overseas: Gross pay and allowances made directly to military and civilian personnel of the United States who are stationed in foreign countries. Exclude payments to employees hired locally abroad who are nationals of other countries. 1b. Less amount withheld and cash collections from employees: Deductions made from gross pay, such as income tax withheld, employees' retirement fund contributions, insurance, etc., and cash collections by the reporting agency from personnel (net of cash payments to personnel)

through postal operations, commissaries, post exchanges, sales of bonds, and similar transactions. 1c. Less other amounts returned to the United States: the estimated portion of net pay returned to the United States by the payee through private channels. Expenditures in Defense commissaries, post offices, etc., by employees of other agencies should be excluded from the computation of these estimates, since these receipts are reported by the Defense Department. 1d. Amount available for spending abroad: Derived by deducting lines 1b and 1c from line 1a.

Item 2a. Payments for goods and services to be provided abroad for U.S. programs abroad: Gross expenditures for goods (excluding amounts reported on line 1a) purchased abroad and services purchased abroad or purchased from U.S. contractors for work to be performed abroad for U.S. programs abroad. Exclude any purchases abroad for import into the United States and procurement financed through grants and loans to other countries (to be included on line 4a or 6a). "U.S. programs abroad" include all programs which have personnel regularly stationed in other countries. 2b. Less procurement in the United States: The estimated portion of the payments on line 2a which represents expenditures by U.S. contractors for procurement of goods and services in the United States. 2c. Procurement abroad for U.S. programs abroad: Derived by deducting line 2b from line 2a.

Item 3. Payments for other purchases of goods and services abroad: Purchases of goods abroad for import into the United States, its territories and possessions; and the purchase of services and incidental goods abroad not covered in item 2 (i.e., not for a "program abroad"). Include reimbursements to travelers abroad who are not stationed abroad (excluding any reimbursement for purchases in the United States or for transportation on U.S. ships or airlines).

Item 4a. Grants: Grants of cash or goods and services to foreign governments, international organizations, institutions, etc. Exclude grants of foreign currencies which are available by international agreement only for cash grant purposes. 4b. Less payments to "limited" procurement accounts. The portion of line 4a, if any, which is placed in "limited" accounts (restricted or letter of credit accounts) available only for expenditure in the United States. 4c. Less other amounts committed to procurement in the United States. The portion of line 4a, other than amounts placed in "limited" procurement accounts (line 4b), which is limited to procurement in the United States. 4d. Net increase (—) or decrease in balance of Treasury notes and demand deposits outstanding. The portion of line 4a, if any, which represents issuances of Treasury notes or deposits to "demand deposit" accounts for future payments abroad, less redemptions of notes or withdrawal of demand deposits. (These transactions at present are applicable only to certain contributions to international organizations.) 4e. Net payment of freely usable funds: Equal to line 4a-4b-4c±4d.

Item 5. Annuities, pensions, and other transfer payments: Cash grants to individuals and payments of annuities, pensions, etc., to persons residing abroad, which do not involve the purchase of goods or services.

Item 6a. Payments on capital account: Loans to foreign governments, businesses, or individuals; investments in international organizations; and special advances. Include long-term credit (i.e., over 1 year) extended for goods and services provided. Exclude loans of foreign currencies which are available by international agreement only for loans. 6b. Less payments to "limited" procurement accounts: The portion of line 6a, if any, which is placed in "limited" accounts (restricted or letter of credit accounts) available only for expenditure in the United States. 6c. Less other amounts committed to procurement in the United States: The portion of line 6a, other than amounts placed in "limited" procurement accounts (line 6b), which is limited to procurement in the United States. 6d. Net increase (—) or decrease in balances of Treasury notes and demand deposits outstanding. The portion of line 6a, if any, which represents issuances of Treasury notes or deposits to "demand deposit" accounts for future payments abroad, less redemptions of notes or withdrawal of demand deposits. (These transactions at present are applicable only to certain investments in international organizations.) 6e. Net payment of freely usable funds: Equal to line 6a-6b-6c±6d.

Item 7. All other payments affecting the balance of payments: Any payments not classifiable above, with a breakdown showing the types of transactions.

Item 8. Subtotal: Sum of lines 1d, 2c, 3, 4e, 5, 6e, and 7.

Item 9. Less payments in excess foreign currencies: Payments included above which are made in currencies of the countries which have been designated as

excess currency countries for the fiscal year involved (as announced in Bureau of the Budget Bulletin No. 64-3 or in future similar issuances). These amounts must agree with expenditures reported by the disbursing officer on standard form 1221. Expenditures, under special foreign currency program appropriations, of currencies no longer designated as excess for the year involved will be excluded.

Item 10. Total payments affecting the balance of payments: The remainder after deducting line 9 from line 8.

Item 11. Latest previous estimate (memorandum entry): Latest previous estimate of payments for the same periods. Unless revisions were made by the Bureau of the Budget in its review, these amounts will be the same as total payments reported on the comparable line of the last report for the same period. For periods which were not shown on the last report, leave the columns blank.

Item 12. Nonexcess currency expenditures without charge to appropriations (memorandum entry): Portion of payments included on line 10 which represents expenditures of "U.S. use" foreign currencies not charged to appropriations (i.e., from agency "FT" accounts).

B. Receipts

Item 1. From sales of goods and services: Collections from sales for cash (including advance payments received) or short-term credit to foreign governments, foreign corporations (including branches and subsidiaries of U.S. corporations) and individuals, other than U.S. employees. Enter on line 1a receipts in U.S. dollars, and on line 1b receipts in foreign currencies. Exclude the portion of foreign currency receipts which are available only for loans or grants in the country concerned.

Item 2. Interest received: Interest received on loans and other credit transactions from foreign governments, other foreign entities, international organizations, and from U.S. nationals where the receipt represents a transfer from abroad. Enter on line 2a receipts in U.S. dollars, and on line 2b receipts in foreign currencies.

Item 3. Loan repayments: Principal repayments to the United States on loans and other long-term credit transactions involving foreign governments, other foreign entities, international organizations, and U.S. nationals where the repayment represents a transfer from abroad. Enter on line 3a receipts in U.S. dollars, and on line 3b receipts in foreign currencies.

Item 4. All other receipts: Any other receipts of Government agencies not provided for in lines 1 through 3, including taxes, indemnities, insurance premiums, etc., with a breakdown showing the types of transactions. Enter on line 4a receipts in U.S. dollars and on line 4b receipts in foreign currencies.

Item 5. Subtotal: Sum of items 1 through 4 in section B.

Item 6. Less receipts in excess foreign currencies: Receipts included above which are in currencies of the countries which have been designated as excess currency countries for the fiscal year involved (see item A-9 above).

Item 7. Total receipts affecting the balance of payments: The remainder after deducting line 6 from line 5.

Item 8. Latest previous estimate (memorandum entry): Latest previous estimate of receipts for the same period. Unless revisions were made by the Bureau of the Budget in its review, these amounts will be the same as total receipts reported on the comparable line of the last previous report for the same period. For periods which were not shown on the last report, leave the columns blank.

Item 9. Special transactions, net (memorandum entry): Portion of receipts included above which are identified in the published balance-of-payments statistics as "special transactions," less any payments offsetting such transactions. These receipts currently include sales of nonmarketable, medium-term securities; prepayments of loans more than 90 days ahead of the scheduled dates provided for in the loan agreement; and advances on military exports.

C. Net excess of receipts (+) or payments (-)

This line will show the result of subtracting line A-10 from line B-7.

Schedule II

Payments and receipts affecting the balance of payments will be distributed by geographic areas on schedule II, as illustrated in exhibit B. The totals of this schedule must agree with the totals on lines A-10 and B-7 respectively of schedule I (Amounts included for excess currency countries will represent U.S. dollar

transactions only, since foreign currency transactions in those countries are deducted on lines A-9 and B-6, respectively.)

1. Western Europe (includes United Kingdom, France, West Germany, Spain, Italy, Iceland, Ireland, Finland, Yugoslavia, Andorra, Austria, Belgium, Luxembourg, Denmark, Greenland, Liechtenstein, Monaco, Netherlands, Norway, Portugal, San Marino, Sweden, Switzerland, Greece, and Turkey, European Atomic Community, European Coal and Steel Community, European Fund, European Productivity Agency, Organization for Economic Cooperation and Development, North Atlantic Treaty Organization).

2. Japan.

3. Canada.

4. Other countries.

5. Other international organizations (includes all international organizations except those listed for inclusion on line 1 above).

6. Total.

Where there is doubt with respect to the country concerned in the case of an individual or firm, the transactions should usually be classified according to the country in which the person is stationed, if U.S. personnel, or the country in which the person or firm is operating in the case of others abroad. Payments mailed or delivered by disbursing officers in the United States to foreign addresses should be classified according to the address of the payee.

JUSTIFICATIONS

Agency submissions will also contain narrative justifications. As a minimum, the justifications should:

(a) Explain, for each category, why the payments estimated for the current and future periods are deemed necessary, and the differences between current estimates and previous estimates for the same period. At least annually (in the March 15 submission), the justification must indicate the reason for each type of payment and each installation in reasonable detail.

(b) Describe the administrative actions taken in the preceding 6 months or contemplated at the time of the submission to achieve the objective of lessening the unfavorable impact of the Government's transactions on the balance of payments, and set forth the effects of these actions on the figures. The description should cover, but not be limited to, any additions or amendments to policy statements previously explained, changes in agency programs, and steps taken to increase utilization of excess foreign currencies.

(c) Where administrative actions described under subparagraph "b" have the effect of increasing overall costs, explain the situation and indicate the magnitudes of such increases.

(d) Where administrative actions might affect the U.S. foreign policy, explain the nature and results of the prior consultations with the State Department.

(e) Where action to reduce the net payments is desirable but is prevented by law or circumstances outside control of the agency, invite attention to the situation and make specific recommendations for removing the barriers to such action. (The figures in the schedules should not assume that the barriers will be removed, but the submission should indicate the adjustments in the figures that would result if they were removed.)

(f) In connection with the foregoing items, indicate clearly all cases where related actions are pending, or related issues are being considered in some other channels, as of the time of submission. (This includes such proposals as may be pending before the Treasury Department for coordination in connection with its responsibilities for the balance of payments.)

The justification should also include a reconciliation of actual figures with figures reported to Commerce for the balance-of-payments statistics in cases where there are differences.

SCHEDULE II. INTERNATIONAL TRANSACTIONS OF THE FEDERAL GOVERNMENT--BY TYPE OF TRANSACTION
(in thousands of dollars)

(NAME OF AGENCY) - TOTAL

DESCRIPTION	FY 1964	FY 1965		FY 1966		FY 1967		FY 1968-1
	Total	July-Dec	Jan-June	Total	July-Dec	Jan-June	Total	1968-1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Receipts								
1.a. Gross pay-U.S. personnel overseas.....								
b. Gross amount withheld and cash collections from employees.....								
c. Gross other amounts returned to the United States.....								
d. Amount available for spending abroad.....								
e. Payments for goods and services to be provided abroad for U.S. program abroad.....								
f. Amount procured in the United States.....								
g. Procurement abroad for U.S. program abroad.....								
h. Payments for other purchases of goods and services abroad.....								

NOTES

1964 designates the past (last completed) fiscal year.
1965 designates the current fiscal year (in progress).
1966 designates the budget year (to start the following July 1).
1968-1 designates the year following the budget year.
Figures illustrated are for the March 15 report; headings to be used in the September 15 report are illustrated on Schedule II (tabular B).

SCHEDULE III. INTERNATIONAL TRANSACTIONS OF THE FEDERAL GOVERNMENT--BY TYPE OF TRANSACTION (CONT.)
(in thousands of dollars)

(NAME OF AGENCY) - TOTAL

DESCRIPTION	FY 1964	FY 1965		FY 1966		FY 1967		FY 1968-1
	Total	July-Dec	Jan-June	Total	July-Dec	Jan-June	Total	1968-1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
B. Disbursements								
a. Gross payments to "limited" procurement accounts.....								
b. Less other amounts committed to procurement in the United States.....								
c. Net increase (+) or decrease in Treasury notes and demand deposits outstanding.....								
d. Net payment of freely usable funds.....								
e. Grants, pensions and other transfer payments.....								
f. Payments on capital account.....								
g. Gross payments to "limited" procurement accounts.....								
h. Less other amounts committed to procurement in the United States.....								
i. Net increase (+) or decrease in Treasury notes and demand deposits outstanding.....								
j. Net payment of freely usable funds.....								
k. Balance of payments.....								
g. Grand total (12+13+14+15+16+17)								

SCHEDULE I. INTERNATIONAL TRANSACTIONS OF THE FEDERAL GOVERNMENT--BY TYPE OF TRANSACTION (CONT.)
(In thousands of dollars)

(NAME OF AGENCY) - TOTAL

DESCRIPTION	FY 1977	FY 1978		FY 1979		FY 1980		FY 1981
	Total Final	July-Dec Prelim.	Jan-June Est.	Total Est.	July-Dec Est.	Jan-June Est.	Total Est.	1981-2 Est.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
9. Less payments in excess foreign currencies.....								
10. Total payments affecting the balance of payments.....								
Memorandum:								
11. Latest previous estimate.....								
12. Recross foreign currency expenditures without charge to appropriations.....								
Section								
1. For sales of goods and services:								
a. In U.S. dollars.....								
b. In foreign currencies.....								
2. Interest received:								
a. In U.S. dollars.....								
b. In foreign currencies.....								
3. Dividends:								
a. In U.S. dollars.....								
b. In foreign currencies.....								
4. Other receipts:								
a. In U.S. dollars.....								
b. In foreign currencies.....								
5. Subtotal.....								

SCHEDULE I. INTERNATIONAL TRANSACTIONS OF THE FEDERAL GOVERNMENT--BY TYPE OF TRANSACTION (CONT.)
(In thousands of dollars)

(NAME OF AGENCY) - TOTAL

DESCRIPTION	FY 1977	FY 1978		FY 1979		FY 1980		FY 1981
	Total Final	July-Dec Prelim.	Jan-June Est.	Total Est.	July-Dec Est.	Jan-June Est.	Total Est.	1981-2 Est.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6. Less receipts in excess foreign currencies.....								
7. Total receipts affecting the balance of payments.....								
Memorandum:								
8. Latest previous estimate.....								
9. Special transactions, net.....								
10. Net excess of receipts (4) or payments (7).....								

SCHEDULE II. INTERNATIONAL TRANSACTIONS OF THE FEDERAL GOVERNMENT--BY AREA
(in thousands of dollars)

[NAME OF AGENCY]

DESCRIPTION	FY 1961			FY 1962			FY 1962
	July-Dec	Jan-June	Total	July-Dec	Jan-June	Total	
	Final	Prelim.	Prelim.	Est.	Est.	Est.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. Payments to:							
1. Western Europe.....							
2. Japan.....							
3. Canada.....							
4. Other countries.....							
5. Other international organizations.....							
B. Receipts from:							
1. Western Europe.....							
2. Japan.....							
3. Canada.....							
4. Other countries.....							
5. Other international organizations.....							

NOTE

1961 designates the past (last completed) fiscal year
1962 designates the current fiscal year (in progress)
1963 designates the budget year (to start the
fiscal year July 1)
Estimates (illustrated here for the September 15 report;
estimates to be used in the March 15 report are
illustrated on Schedule I (Exhibit A).

APPENDIX V.—Draft of Federal Council for Science and Technology policy guidelines for research investment abroad by U.S. agencies,¹ with explanatory statement from the Office of Science and Technology

Prepared and Submitted by the International Committee, August 7, 1964

POLICY GUIDANCE FOR RESEARCH INVESTMENT ABROAD BY U.S. AGENCIES

I. GENERAL U.S. INVOLVEMENT IN SCIENCE OUTSIDE THE UNITED STATES

The United States is involved in a wide range of scientific activities conducted in foreign countries, including investment in research conducted by foreign scientists. This involvement is a fundamental necessity, because our scientific community cannot remain aloof from the world of science without paying a penalty in terms of wasted and ineffective effort and missing new advances useful to our society.

The Government of the United States, whose science activities constitute an important part of the broader total of national involvement, must be concerned with research outside this country. First, scientific progress contributes to the economic and cultural development of all countries, and in this and other ways advances the interests of the United States. Second, this involvement is essential to the attainment of the statutory objectives of a number of agencies. The following is directed to this latter aspect.

II. INVOLVEMENT TO ATTAIN AGENCY OBJECTIVES

Today scientific excellence is widely dispersed and the programs of Federal agencies will be hampered if they remain aloof from scientific contact with foreign laboratories. Major areas of inquiry, such as oceanography, geophysics

¹ This statement reaffirms the basic principles stated in the Federal Council of Science and Technology report of June 20, 1961, "International Scientific and Technological Activities," and the report of Sept. 4, 1962, by the International Science Panel of the President's Science Advisory Committee, "Research Support Abroad Through Grants and Contracts," and amplifies them only insofar as is indicated by accumulated operating experience and changing economic circumstances in this country and abroad.

and meteorology, take meaningful form only on a broad regional or global basis. In addition, there exist outside our borders unique opportunities in the form of natural conditions, unusual materials, unusually well-qualified people, and specialized facilities. These factors which characterize the contributions from research carried on outside the United States are at the same time the criteria which define the types of foreign research with which the Federal technical agencies should be involved.

The statutory objectives of these agencies include many vital matters: defense of the Nation; protection of the health of our citizens; increase of manufacturing and agricultural productivity; enhancement of special efforts, such as scientific and industrial exploitation of nuclear phenomena and the conquest of space. Technical agencies are not involved in research outside the United States to provide assistance to other countries; this is in the province of the Department of State and the Agency for International Development.² Rather, scientific capabilities in other countries are used for the attainment of domestic missions. Agency involvement for this purpose takes the form of—

Direct overseas operations, such as tracking stations or health laboratories;

Research procurement by contract with foreign laboratories;

Collaborative arrangements with other countries; or

Investment in research of interest to United States through grants to foreign investigators.

This involvement does not necessarily include financial assistance to foreign institutions or laboratories: the vital interest of the Federal agencies is in ensuring that the required research is done and is done well. In the last few years there has been a growing ability and tendency in many countries to expand indigenous investments in research. Thus, some of our objectives are being met without the expenditure of our own funds.

III. AGENCY INVOLVEMENT AND U.S. FOREIGN POLICY

The structure, vigor and direction of scientific development within a foreign country can be affected by—

The extent of our total involvement;

The rate of change—upward or downward—in the volume of U.S. funds invested;

The degree of concentration of these funds in individual institutions;

Specific agency administrative practices; and

Compatibility of our research goals with the priorities of the foreign country.

An agency's desire to accomplish certain scientific goals is part of and in turn affects other aspects of our foreign policy objectives. A close relationship with the Department of State must be maintained to insure the fullest accord between agency program needs and U.S. foreign policy considerations.

With the guidance of the Department of State agencies should endeavor, through consultation with appropriate officials of the foreign country, to insure that their activities are in consonance with the general "science ecology" of the country. Agency involvement often enhances the general condition of science within the foreign country, and agencies should generally try to maximize ancillary benefits to the foreign country. Among such benefits are:

Stimulation of support for science from indigenous sources;

Strengthening of relationships within the world community of science;

Improved recognition and status for science.

In this light, agencies should take the following measures in developing foreign programs:

1. Emphasize the development of collaborative efforts involving local support of the foreign component of the program;

2. Urge that all possibilities of indigenous support for a desirable project be thoroughly explored before providing U.S. support;

3. Insure that the administration of the grant, contract or agreement is in consonance with the prevailing policies and practices within the country.

² This also becomes a matter of concern to the technical agencies since legislation as well as sound management dictate the use of technical agency capabilities in State and AID programs when appropriate. These aspects are not treated in this paper.

IV. INTERNATIONAL ECONOMIC CONSIDERATIONS OF RESEARCH SUPPORT ABROAD

General economic factors, in the United States and overseas, legitimately affect the volume of Federal money spent for research abroad. The continuing need to economize and the U.S. balance-of-payments situation are factors affecting the proper magnitude of investment in overseas science.

Grants or contracts for research outside this country are justified in advanced countries because a generally favorable economic situation in a foreign country does not in itself ensure that research of high priority to Federal agencies will be given a high priority by the foreign country. Also, there is no assurance that cessation of U.S. support of specific research in a country will result in the financing of that research by that country. The proper course of action in this circumstance is to press for expansion of research support by the foreign country, but to bear in mind the importance to the United States of insuring that selected research is indeed carried forward.

V. ADMINISTRATION OF RESEARCH INVESTMENT ABROAD

Several practices and policies should be adopted by the agencies :

Relevance to missions

1. Foreign research support should be limited to projects which are of the highest relevance to an agency's mission and which cannot be carried out effectively in this country.

Efficient and economical administration

2. Administrators have a responsibility to obtain the best research at the lowest cost and to inculcate cost consciousness on their staffs.

3. Foreign research agreements should: provide payment for indirect costs only when necessary; include practicable "Buy American" clauses; minimize payment for international travel; provide payment in excess U.S.-owned foreign currencies whenever possible; exclude payments for import duties on equipment or supplies.

4. Grants or contracts should normally make use of existing facilities as opposed to creating major new foreign-owned facilities.

5. Individual projects involving large sums of money (e.g., \$100,000 or more) should be formally reviewed by a higher level in the agency than that normally involved.

6. Research funds should be made available in advance only if necessary to the orderly progress of the work, and then in the minimum amounts required.

7. Research agreements should have the minimum duration required for effective prosecution of the work, and extension of support should be based on a careful review of the work to date.

VI. GENERAL LIMITS ON AGENCIES' FOREIGN RESEARCH EXPENDITURES

The total amount of money which each agency should devote in each year to financing of research outside the United States should be derived from a carefully designed plan. This plan should spell out the considerations which require the agency to become involved with scientists and research in other countries. It should deal with the totality of the involvement, and not be limited to those aspects of the relationships which involve expenditures. The plan should spell out details for the near future, and provide general operating principles and a guiding philosophy for the more remote future. The plan should also provide dollar levels of support, proposing specific levels for the near future and reasonable ranges for the more remote future. The missions of the agencies, and the nature and degree of their involvement with science outside the United States, vary so widely that the plan of the agencies will also vary widely.

As part of the process of budget formulation, plans should be made known to the Bureau of the Budget in appropriate detail and at appropriate intervals. The following principles are relevant in judging the proper magnitude of research expenditures abroad:

1. The choice of an agency to spend its research funds in the United States or outside the United States is basically a technical program decision, and other considerations are secondary.

2. Financing of research outside the United States may be a species of foreign aid where the agency charter permits, but for technical agencies, it is a means of attaining agency objectives.

3. Economic conditions in this and other countries legitimately affect but should not solely govern the level of research expenditures outside the United States.

4. Changes upward or downward in the level of support for research in foreign countries should be gradual.

Scrutiny of agency plans, to ensure that the criteria stated in this document are in fact observed, is a proper part of the budgetary process, and is expected from the operating agencies.

VII. ADDITIONAL ASPECTS OF AGENCY INVOLVEMENT IN FOREIGN RESEARCH

Although Federal agencies become involved in research in other countries to further their statutory missions, this involvement can yield ancillary benefits to this country:

Furthering our foreign policy objectives through increasing international scientific contacts, developing common goals with other nations, enhancing the image of U.S. science abroad and by assisting developing nations;

Strengthening our general security by ensuring a strong scientific base in allied countries;

Contributing to our long-term goal of bettering man's intellectual and material well-being;

Enhancing the opportunities for advanced training of U.S. scientists in research facilities outside the United States.

Agencies should administer their foreign scientific programs and activities so as to obtain maximum contribution from these ancillary benefits.

Conversely, agency support of research abroad should not hinder the development of U.S. capabilities and facilities in the same field. Care must be taken that this research support enhances rather than inhibits the development of American science.

STATEMENT FROM THE OFFICE OF SCIENCE AND TECHNOLOGY

SEQUENCE OF WORDING OF FCST CRITERIA FOR SUPPORT OF RESEARCH OUTSIDE THE UNITED STATES BY FEDERAL AGENCIES

1. The International Committee of the Federal Council for Science and Technology developed, on its own initiative as part of the general charge given to it by the Council, a draft set of criteria on Policy Guidance for Research Abroad by U.S. Agencies. This draft was transmitted to the Council by the Chairman of the International Committee on August 7, 1964.

2. The draft was considered by the Council at its meeting on August 18, 1964. In presenting the draft, the Executive Secretary of the International Committee "called to the Council's attention an amendment to the policy paper previously proposed by AEC and accepted by the International Committee, but inadvertently omitted; e.g., page 7, section VI, insert 'where the scale of agency support of foreign research warrants it * * *.' This amendment was accepted by the Council as was the second change, page 6, section V(1); e.g., to read 'foreign research support should be limited to projects which are of the highest relevance to the agency's missions and which can be carried out more effectively outside this country.'" (Quotation from the minutes of the Federal Council for Science and Technology, Aug. 18, 1964.)

3. The Council endorsed the version approved by its International Committee, and not the version inadvertently included in the draft forwarded to the Council.

4. Accordingly, the only wording of the clause in question that the Council endorsed was the clause "and which can be carried out more effectively outside this country." Thus, the amendments of December 1964, did not change the position of the Council on this question, but related solely to strengthening of the criteria relating to consideration of the balance-of-payments problem in making awards outside the United States. The two paragraphs that were amended in December were specifically footnoted. No other wording was changed.

APPENDIX VI.—*Department of Defense Directive 7060.5 relating to supplies and services for use outside the United States*

DEPARTMENT OF DEFENSE DIRECTIVE NO. 7060.5, MAY 14, 1965

Subject: Balance of Payments Program—Supplies and Services for Use Outside the United States.

References:

- (a) DOD Instruction 7060.2, "Budgeting, Accounting, Reporting, and Managing Department of Defense Transactions Entering the International Balance of Payments," December 16, 1964.
- (b) Secretary of Defense Multiaddressee Memoranda, "Supplies and Services for Use Outside the United States," July 16, 1962, and Amendments Thereto (hereby canceled).
- (c) Secretary of Defense Multiaddressee Memoranda, "Procurement of Research and Development Outside the United States," August 15, 1962, and Amendments Thereto (hereby canceled).
- (d) DOD Instruction 7360.9, "Use of United States-owned Foreign Currencies," April 15, 1965.
- (e) Deputy Secretary of Defense Memorandum, "Applicability of DOD Directives to Defense Transactions in the Ryukyu Islands," December 4, 1962 (hereby canceled).
- (f) Armed Services Procurement Regulations, Section VI, Paragraph 6-001.

I. PURPOSE

This directive establishes policies for procurement of supplies and services for use outside the United States for the purpose of reducing the adverse effect of Department of Defense procurement transactions on the U.S. international balance of payments and assigns responsibilities for implementing these policies.

II. CANCELLATION

The directive supersedes and cancels references (b), (c), and (e).

III. APPLICABILITY AND SCOPE

The provisions of this directive apply to all Department of Defense procurements of supplies and services for use outside the United States, its possessions, and Puerto Rico, except construction, procurement of POL, procurements for the military assistance program, and procurements for nonappropriated fund activities. The provisions of this directive also apply to procurements of scientific and technical knowledge which result in expenditures outside the United States, its possessions, and Puerto Rico.

IV. DEFINITIONS

U.S. end product.—An unmanufactured end product which has been mined or produced in the United States, or an end product manufactured in the United States, if the cost of its components which are mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. (See reference (f).)

U.S. services.—Those that are performed within the United States. In some instances, services provided under a single contract are performed partially in the United States and partially abroad. Such services shall be considered U.S. services if 25 percent or less of the total cost of the services is attributable to services (including incidental supplies used in connection therewith) performed outside the United States.

Foreign end products.—Those other than U.S. end products.

Foreign services.—Those other than U.S. services.

V. POLICIES

A. *Supplies and services, except procurements of scientific and technical knowledge*

1. Procurements of supplies for use outside the United States, its possessions, and Puerto Rico will be restricted to U.S. end products (a) whenever the estimated delivered price will not exceed \$10,000, and (b) when the estimated delivered price will exceed \$10,000 upon determination that the cost of U.S. end

products (including transportation and handling costs) is not more than 50 percent greater than the cost of similar foreign products (including transportation and handling costs).

2. Procurement of services generated by requirements outside the United States, its possessions, and Puerto Rico will be limited to U.S. services (a) whenever the contract price will not exceed \$10,000, and (b) when the estimated contract price will exceed \$10,000 upon determination that the cost of U.S. services is not more than 50 percent greater than the cost of foreign services.

3. In connection with 1 and 2 above, if the U.S. cost exceeds the foreign cost by more than 50 percent and the estimated contract price will exceed \$10,000, the matter will be forwarded to the Secretary or Deputy Secretary of Defense for determination.

4. When a requirement can only be filled by foreign products or by services performed abroad, procurements of foreign products or services will be made only if it is determined by the appropriate authority designated below that U.S. end products, or services performed in the United States, are not available and that it is not feasible to forego filling the requirement:

(a) By the authorities listed in enclosure 1, or their immediate deputies, when the procurement is estimated not to exceed \$1 million, provided that this authority may be redelegated for procurements of not more than \$10,000;

(b) By the Secretary of the Department concerned or the Director, Defense Supply Agency, when the procurement is estimated to exceed \$1 million but not \$3 million;

(c) By the Secretary or Deputy Secretary of Defense, when the procurement is estimated to exceed \$3 million.

B. Exceptions

1. Procurements of foreign supplies and services are authorized as exceptions to the policies set forth in paragraph A above only under the following circumstances:

(a) Treaty or executive agreement: Procurements required to be made from indigenous sources pursuant to a treaty or executive agreement between governments.

(b) Small purchases: Procurements estimated not to exceed \$500 in foreign cost.

(c) Compelling emergencies: Procurements estimated not to exceed \$10,000 in foreign cost when required by compelling emergencies.

(d) Perishable subsistence: Procurements of perishable subsistence items where it is determined that delivery from the United States would destroy or significantly impair their quality at the point of consumption.

(e) Procurements of bananas, tea, coffee, spices, herbs, sugar, cocoa, cream of tartar, tapioca, and coconut.

(f) Nonavailability in the United States: Procurements determined in advance, in accordance with A-4 above, to be not available in the United States.

(g) Procurement of the following, provided such procurements do not duplicate or replace existing organic military service capability: (1) Utilities, (2) communications services, (3) port handling and stevedoring services, (4) maintenance and repair services and spare parts for foreign manufactured vehicles, equipment, machinery, and systems provided in the case of spare parts that the exception applies only if the procurement must be restricted to the original manufacturer or his supplier, (5) packing and crating services, (6) laundry and drycleaning services, (7) coal handling and storage services, (8) industrial gases, and (9) transportation services.

(h) Procurement of custodial services, part-time instructors services, printing services for base newspapers, dry ice, and into-plane refueling, provided that the foreign cost is estimated not to exceed \$10,000.

(i) Unreasonable cost: Procurements of less than \$10,000, other than those covered in (a) through (h) above, where U.S. end products or services are available and it is determined that the difference between the domestic cost and the foreign cost is so large as to make procurement of foreign end products and services clearly desirable.

2. The determinations necessary under B-1(d), B-1(f), and B-1(i) above will be made prior to procurement by the approving authorities designated in enclosure 1 to this directive, or their immediate deputies. With respect to the determination under B-1(d) and B-1(f), authority for procurements estimated not to exceed \$10,000 in foreign cost may be redelegated by such approving authorities.

C. Procurement of scientific and technical knowledge

1. Procurements for the generation or acquisition of scientific and technical knowledge under contract resulting in expenditures which enter the international balance of payments will be made only under the following circumstances:

(a) Treaty or executive agreement: Procurements required to be made from indigenous sources pursuant to treaty or executive agreement between governments.

(b) Small purchases: Procurements estimated not to exceed \$500 in foreign cost.

(c) Compelling emergencies: Procurements estimated not to exceed \$10,000 in foreign cost when required by compelling emergencies.

(d) When it is determined in advance that the requirement cannot be met without resulting in expenditures which enter the international balance of payments. This determination will be made by—

(1) The individuals designated in enclosure 2 for contracts of not more than \$1 million except that this authority may be redelegated to individuals specifically designated for the purpose in the case of contracts of not more than \$15,000.

(2) The departmental Secretary, or for defense agencies, by the Director of Defense Research and Engineering, in the case of contracts exceeding \$1 million but not more than \$3 million.

(3) The Secretary or Deputy Secretary of Defense for all contracts of more than \$3 million.

2. Procurement of scientific and technical knowledge resulting in balance-of-payments expenditures will, whenever practical, be made on a cost-sharing basis or other arrangements designed to limit any adverse effect on the balance of payments. Policy questions concerning such arrangements should be directed to the Assistant Director (International Programs) of the Office of the Director of Defense Research and Engineering.

D. Deviations.—For larger procurements (e.g., over \$250,000) where it is believed that the low domestic bid will involve substantial foreign expenditures, or that the low foreign bid will involve substantial domestic expenditures, a request for deviation from the foregoing should be considered. Each such request will be submitted for the approval of the ASD (I. & L.). Solicitations for offers on procurements for which deviation is authorized will describe the procurement evaluation procedures that will be used.

E. Ryukyu Islands.—Procurements of manufactured end products (including construction materials) mined or produced in the Ryukyu Islands, or end products, including construction materials, manufactured in the Ryukyu Islands where the cost of those components which are mined, produced, or manufactured in the Ryukyu Islands or the United States exceeds 50 percent of the total component cost will be exempt from the policies set forth in A through D above.

F. Canada.—Procurements of Canadian end products or United States end products, and procurements of services from Canadian or domestic concerns, for use in Canada will be exempt from the policies set forth in A through D above. Procurements of scientific and technical knowledge resulting in expenditures in Canada are exempt from the policies set forth in C above.

G. Excess foreign currencies.—Procurements will be made with excess foreign currencies of the countries listed in reference (d) if procurement using such currencies does not increase the cost to dollar appropriations. Procurements made with excess currencies are exempt from the provisions of this directive which otherwise would require that the particular procurement be limited to U.S. end products. Payment for such procurements may also be made in both local currency and dollars if the dollar portion is limited to the contractor's validated direct dollar cost of the U.S. export content of these procurements.

H. Criteria for determining balance-of-payment effect.—The determination as to whether procurement transactions enter the international balance of payments will be based on the criteria contained in reference (a).

I. Procurements will not be broken into separate purchases to avoid the dollar limitations prescribed herein.

VI. RESPONSIBILITIES

The ASD (I. & L.) will develop procedures to implement the above policies for publication in ASPR or other appropriate issuances.

VII. EFFECTIVE DATE

This directive is effective upon publication.

CYRUS VANCE,
Deputy Secretary of Defense.

APPROVING AUTHORITIES—SUPPLIES AND SERVICES, OTHER THAN FOR SCIENTIFIC
AND TECHNICAL KNOWLEDGE

Department of the Army :

1. Commanding General, U.S. Army, Communications Zone, Europe.
2. Commanding General, U.S. Army, Japan.
3. Commanding General, U.S. Army, South Command.
4. Chief, U.S. Army Security Agency.
5. Chief of Engineers.

Department of the Navy :

1. Commander in Chief, U.S. Naval Forces, Europe.
2. Commander, U.S. Naval Forces, Japan.
3. Commander, U.S. Naval Forces, Philippines.
4. Commander, Barrier Forces, Atlantic.
5. Commander, Service Force, Atlantic Fleet.
6. Commander, Service Force, Pacific Fleet.
7. Chief, Bureau of Supplies and Accounts.
8. Commander, Military Sea Transportation Services (MSTS).

Department of the Air Force :

1. Commander, U.S. Air Forces in Europe.
2. Commander, U.S. Air Force Southern Command.
3. Commander, Pacific Air Force.
4. Commander, 16th Air Force.
5. Commander, Military Air Transportation Service (MATS).
6. Commander, Air Force Logistics Command.
7. Commander, Air Force Systems Command.

Defense Supply Agency—Executive Director, Procurement and Production.
Defense Communications Agency—Director.

APPROVING AUTHORITIES—SCIENTIFIC AND TECHNICAL KNOWLEDGE

Department of the Army :

1. Commanding General, Army Materiel Command.
2. Chief of Engineers.
3. Surgeon General, Army Medical Corps.
4. Commanding General, Army Research Office.

Department of the Navy :

1. Chief of Naval Research.
2. Chief, Bureau of Ships.
3. Chief, Bureau of Naval Weapons.
4. Chief, Bureau of Medicine and Surgery.
5. Chief, Bureau of Supplies and Accounts.

Department of the Air Force :

1. Commander, Office of Aerospace Research.
2. Commander, Air Force Systems, Command.
3. Commander, Air Force Logistics Command.

Defense agencies :

1. Director, Advance Research Projects Agency.
2. Director, Defense Atomic Support Agency.
3. Director, Defense Communications Agency.
4. Director, Defense Intelligence Agency.
5. Director, National Security Agency.

APPENDIX VII.—*Public Health Service, Division of Research Grants, statement regarding policies and procedures for grants to foreign institutions and international organizations*

U.S. PUBLIC HEALTH SERVICE, DIVISION OF RESEARCH GRANTS

Subject: Policies and procedures for Public Health Service research grants to foreign institutions and international organizations.

Applicability: Public Health Service research grants.

Effective date: July 1, 1964.

A. CRITERIA FOR AWARD OF FOREIGN RESEARCH GRANTS

In addition to the elements taken into consideration by study sections and councils or committees in the review of domestic applications, the following criteria shall be applied in determining whether a foreign research grant shall be awarded:

1. The foreign research proposal is of such a nature that the results are likely to advance significantly the status of the health sciences in both the United States and the country of the applicant; and either

2. (a) Is outstanding or original in concept or (b) would utilize talents, skills, materials, or clinical, epidemiological, population, or other resources not likely to be readily available to the United States; or

3. Is directly relevant to the program objectives and included in definitive program plans of the institute or division concerned.

Study sections will be expected to review all foreign grant applications in the same manner that they review domestic requests; that is, independent of the foreign criteria. On the other hand, the advisory councils/committees and staff would welcome advice from the study section on the applicability of the first and second criteria to the proposal under review. Such advice should be included on the summary statement, apart from the recommendation on scientific merit. The institute and division program staffs, with the advice of the advisory councils and committees, shall determine whether the applications meet the criteria necessary for award.

B. TERMS AND CONDITIONS OF FOREIGN GRANTS

1. *Eligibility for project grants*

Foreign institutions and international organizations may apply for support of discrete research projects but are not eligible to apply for other types of grants (such as center grants, construction grants, general research support grants, and special resource grants) designed to promote research in the United States.

2. *Purpose of grants*

The purpose of Public Health Service foreign research grants is to advance the status of the health sciences in the United States. The Public Health Service is not authorized to make grants for the primary purpose of advancing the "international status of the health sciences through cooperative enterprises in health research, research planning and research training." Such authority (Public Law 86-610, sec. 5) is reserved to the President, and could be exercised by the Public Health Service only upon specific delegation.

3. *Purposes for which grant funds may be expended*

Funds made available through foreign grants may be expended to cover direct costs of research in accordance with part V of the Grants Manual. The Public Health Service will not pay indirect costs associated with the conduct of research in foreign institutions or by international organizations.

4. *Special considerations for approval of foreign grants*

To insure that foreign grants are for support of exceptionally meritorious research which furthers the program objectives of the Public Health Service, only those applications with a high priority for a particular advisory council or committee meeting may be approved for award, except on the express approval of the bureau chief concerned. In determining priorities, the councils and committees will take into consideration not only the recommendations of the study sections but also the extent to which, in accordance with criterion three for the award of foreign grants, the application is important to the program objectives and plans of the institute or division.

5. *Special provisions relating to purchase of equipment*

In the interest of maintaining a favorable balance-of-payments position in the United States, every effort will be made to keep dollar expenditures abroad to a minimum. Accordingly, foreign grantees must purchase all single items of equipment costing \$2,000 or more (excluding transportation, delivery, and installation charges) from U.S. sources. Purchases from other sources are allowed when purchase from U.S. sources would impair the conduct of research as a consequence of such factors as (a) inability of U.S. equipment to produce

data with the required precision, (b) differential delivery lag of 6 months or more, (c) incompatibility with existing equipment, and (d) absence of service facilities and difficulty in receiving replacement parts. Grantees must demonstrate in their applications that such conditions exist, and the program staff of the institute/division will review each such request.

C. REVIEW PROCEDURES

1. General

Applications for research grants submitted by foreign institutions and international organizations will be processed in accordance with the instructions described in the most recent revisions of the application form, the Public Health Service grants manual and the "information statement on research grant applications originating in countries outside the United States of America." The Division of Research Grants shall arrange for study section review of applications according to usual procedure, and refer each of these to the appropriate institute or division.

2. Study section and institute or division review of applications

(a) Study sections shall (1) evaluate foreign grant applications for scientific merit, (2) assign priority scores precisely as they do for domestic applications recommended for approval, and (3) advise as to whether the research proposed meets the first and second criteria for foreign grants (A-1, A-2).

(b) Institute and division program staffs, with the help of advisory councils/committees, shall weigh the factors cited under A-1 and A-2 and, in addition, determine whether the research to be conducted is sufficiently relevant to the program objectives and plans of the institute or division concerned. The national advisory councils and committees will consider all of these factors in determining the final priority score for each application.

3. Special conditions set by the Surgeon General

(a) The total amount of foreign grants awarded by an institute or division may not exceed such ceilings as may be established by the Surgeon General.

(b) Express approval of the Bureau Chief or his deputy is required for award of applications in which (1) \$100,000 or more has been recommended for award in any one year, or (2) a commitment of more than 3 years is proposed, or (3) the grantee is an individual in a foreign country, regardless of his nationality, who is not sponsored by a university or other institution.

D. ROLE OF THE OFFICE OF INTERNATIONAL RESEARCH

1. This Office provides information to Public Health Service staff on foreign research resources, policies, institutions, etc.; foreign national agencies which support biomedical research; and data on the financing of research in other countries and their human and material resources for research.

2. It works cooperatively with the institutes and divisions to assist them in resolving the problems generated by the need to reconcile institute and division program interests with general policies of the Public Health Service and of the United States.

3. It provides information and advice to the Division of Research Grants on applications received from international intergovernmental or international professional organizations. This service is provided to insure consistency with general Public Health Service commitments and with policies of the United States relating to such organizations.

4. All foreign grants, including grants to international, intergovernmental, and professional organizations, recommended for approval by National Advisory Councils or committees and proposed for payment by an institute or division shall be examined by OIR to insure that—

(a) The award of the grant by the Public Health Service is consonant with the foreign policy of the United States (see PPO No. 79, dated July 30, 1963).

(b) Maximum use is made of foreign currencies (see PPO No. 92, dated July 5, 1963).

5. The Office of International Research shall continue to exchange with institutes and divisions of the Public Health Service, in a timely manner, any information which will aid in the efficient execution of the responsibilities of each in connection with applications and grants involving foreign countries.

E. DEFINITIONS AND COVERAGE

1. Foreign research grants are grants (excluding utilization of funds made available under the authority of Public Law 83-480) to foreign institutions and international organizations (as defined below) for the support of research conducted in foreign countries. Such grants are foreign grants regardless of the nationality of the principal investigator.

2. Foreign institutions are defined for the purpose of grant administration basically as universities, institutes, research associations, organizations or laboratories whose primary functions relate to the needs of other countries. Among the criteria to be applied in determining status are whether the organization has headquarters and physical facilities in a foreign country; whether it is incorporated in and subject to the laws of that country; and whether it is financed basically from sources other than the United States and controlled by nationals other than U.S. citizens. The status of branches or units of U.S. organizations established in foreign countries will be determined on a case-by-case basis.

3. International intergovernmental organizations are those organizations whose membership comprises national governments, regardless of the location of their headquarters or their source of support. They include but are not limited to such organizations as World Health Organization, Pan American Health Organization, and Institute of Nutrition of Central America and Panama.

4. International professional organizations are those professional organizations whose membership comprises national professional societies and individuals of more than one country, but not government, regardless of the location of their headquarters or their source of support.

Originating office: Office of International Research.

Reviewed by: Executive Committee for Extramural Affairs, Environmental Health Committee on Extramural Programs, Community Health Research Grants Committee, Interbureau Advisory Committee for Extramural Programs.

Approved by: Grants Policy Officer, OSG.

APPENDIX VIII.—*National Science Foundation Circular No. 45 relating to support of research in foreign countries (December 18, 1964)*

Subject: Support of research and certain related activities in foreign countries.

1. Purpose: This circular states Foundation policies and procedures governing the support of research and certain related activities in foreign countries.

2. Cancellations: This circular cancels the following memorandums:

Memorandum to members of the senior staff, November 19, 1959—NSF policy with respect to the support of foreign basic research.

O/D-114, June 19, 1962—foreign travel of dependents under basic research grants.

O/D-134, December 6, 1962—research grants to foreign institutions where the principal investigator is a U.S. citizen.

This circular also cancels paragraph A only (basic research) of O/D-92, January 22, 1962—international activities of the National Science Foundation; and the first paragraph of Administrative Instruction No. 75, January 22, 1962—foreign science activities of the National Science Foundation.

3. Policy:

(a) *Source*.—The policies as outlined below are based in part upon Foundation experience to date and in part on a statement of the Federal Council for Science and Technology, entitled "Policy Guidance for Research Investment Abroad by United States Agencies," endorsed by the Council on August 18, 1964.

(b) *Considerations*.—Various agencies of the U.S. Government, the National Science Foundation among them, are involved in a wide range of scientific activities abroad, including the support of research undertaken by foreign institutions. This involvement is justified on a variety of grounds, the most basic of which is the inherently international character of science. The Federal Government in general and the Foundation as a particular agency cannot be separated from scientific activity throughout the world without isolation from new advances of importance.

(c) *Conclusion*.—In accordance with NSF's responsibilities and objectives in promoting the progress of science within the United States, it is Foundation policy to support basic research abroad as a supplement to the national research effort. Individual instances of such support must be consistent with the aims

of U.S. foreign policy and must assure the immediate availability of the research results to the U.S. scientific community.

4. Financial limitations:

(a) *General.*—Considering the budgetary constraints which presently confront NSF and which are expected to prevail throughout the foreseeable future, the Foundation cannot contemplate an expanding program of research abroad. The number and dollar value of foreign research grants must remain a very small fraction of total Foundation support of basic research.

(b) *Annual limitation on funds.*—The total amount of funds for financing research outside the United States is limited as a result of certain economic factors. Specifically, because of the balance of payments ("gold-flow") problem, the Bureau of the Budget annually establishes a limitation on the funds for financing research outside the United States which NSF may obligate within that fiscal year.

(c) *Exclusions.*—The above limitation applies only to grants for research projects which are awarded by the research divisions. Excluded from the limitation are grants awarded as part of international cooperative activities, which require substantial funding by all participating countries.

(d) *Responsibility.*—The Associate Director (research) is responsible for assuring that the annual limitation is not exceeded and that a specific determination to this effect is entered in each appropriate grant file.

5. Conditions for awarding grants: Within the financial limitations described above, the Foundation will support research in foreign institutions in accordance with the following general conditions:

(a) The proposed support must be in consonance with the prevailing research policies and practices of the particular foreign country or countries;

(b) Support will be granted only for projects that are directly pertinent to NSF's responsibilities for supporting science in the United States;

(c) The project must be one which can be carried out more effectively by a foreign institution than by an institution in the United States;

(d) The possibility of indigenous support for the project must have been thoroughly explored and found inadequate (when possible, projects should be cooperative with some local support of the foreign component); and

(e) The prospective principal investigator must be of outstanding competence for the performance of the proposed work; or

(f) Unique facilities or geographic location must be essential contributing factors to the success of the proposed project; or

(g) The institution to be supported offers significant scientific training to U.S. scientists.

The Director or the Deputy Director may waive these general conditions for certain international programs in which the Foundation participates or furnishes leadership, when the program is one that involves special reciprocal arrangements with foreign governments or consists of mutually agreed upon efforts with other nations (e.g., the Antarctic program and the International Indian Ocean Expedition).

6. Special procedure for approving foreign research grants:

(a) *Within NSF.*—To enhance the overall coordination of international science activities within the Foundation, it is the responsibility of each program to inform the Office of International Science Activities (OISA) upon receipt of a foreign research proposal by forwarding a copy of the proposal to that Office. It is the further responsibility of each program handling foreign research proposals to discuss them with OISA early in the process of considering them. This procedure will enable OISA to assist in the recognition and resolution of any problems that may be involved in providing support for the proposed projects.

(b) *Coordination with Department of State.*—Research grants to foreign institutions made by the National Science Foundation, irrespective of the nationality of the principal investigator may not be awarded prior to approval by the Department of State. When a recommendation for a foreign research grant is made, the Grants Office will prepare a letter (for signature of the Director or Deputy Director) requesting the Secretary of State's approval of the proposed grant. A copy of the grant summary sheet will accompany the letter.

The Department of State will normally request the U.S. Embassy concerned to comment on the proposed grant, with respect to: its appropriateness in relation to U.S. foreign policy objectives; its compatibility with the foreign and

domestic policies of the foreign country; the possibility of its proving embarrassing in any way to the United States or to the foreign government; and its impact on the general economy and research support practices of the foreign country.

Upon receipt of approval of the proposed grant from the Department of State, the Grants Office will prepare the award letter. If the reply from the Department of State is unfavorable or is qualified in any way, such information will be referred to the responsible program and to OISA.

7. *Grant provisions:* The specific provisions of grants to foreign institutions for support of research, irrespective of the nationality of the principal investigator, will be drafted in accordance with the following requirements;

(a) *Facilities.*—Such grants will make use of existing facilities, rather than provide funds for new foreign-based facilities, except when the new facilities are essential to the research and otherwise unavailable to the foreign institutions, and when the success of the project is contingent on geographic location (e.g., certain biological research in the tropics and astronomical observations from the Southern Hemisphere).

(b) *Payment.*—Grants to foreign institutions will—

(1) Exclude payment for indirect costs;

(2) Exclude payment for import duties on equipment or supplies;

(3) Include practicable "Buy American" clauses;

(4) Minimize payment for international travel;

(5) Provide payment in foreign currency owned by the United States (e.g., Public Law 480 funds) whenever possible; and

(6) Provide advance payment of funds only as necessary to support the normal progress of the project.

(c) *Duration.*—Grants will have the minimum duration required for effective prosecution of the research.

8. *Grant Renewal:* Continued support of the research will be provided only after a careful, critical review of the work accomplished under the initial grant.

9. *Grants to U.S. institutions involving support of research abroad:* A number of grants to U.S. institutions include some support of research which is to be conducted abroad. In order to assist in the accumulation of more realistic data on U.S. expenditures on research carried out in foreign countries, program directors will be responsible for forwarding to OISA summary sheets of all approved grants to U.S. institutions, which include funds for any research activity to be conducted abroad. Pertinent portions of the summary sheets should be marked for the attention of OISA; and supplementary information should be provided if necessary to clarify the amount of funds estimated for research activities abroad.

10. *Support for dependents' travel to foreign countries:* The Foundation is frequently requested to employ grant funds to provide support for dependents' travel abroad, under grants to U.S. institutions in instances when the investigator is to perform the research abroad. In such cases, support for dependents' travel will be provided only under the following conditions:

(a) The investigator must be a senior person whose full-time presence is essential to the effective performance of the project;

(b) His residence outside continental North America for a continuous period of 9 months or more must be essential to the effective performance of the project;

(c) The payment of a travel allowance for dependents must be consistent with the policies of the university or other institution administering the grant; and

(d) The maximum amount allowed for travel of an investigator's dependents will be the lesser of two amounts: either the round trip jet economy air fare required for all accompanying dependents; or $2\frac{1}{2}$ times the round trip jet economy air fare for one adult between the United States and the foreign country involved.

JOHN T. WILSON,
Deputy Director.

APPENDIX IX.—*National Institutes of Health, Office of International Research, a report entitled "International Biomedical Research and Research Training Activities—New Patterns of Research in Europe" (November 1965)*

NEW PATTERNS OF RESEARCH SUPPORT IN EUROPE

A conspicuous recent development in research organization in Europe has been the appearance of programing bodies in national science agencies. While all national agencies have had bodies of scientific experts serving as consultants to the agency (resembling NIH study sections and councils), this year a new level of scientist-participation in national science planning has emerged in Holland, Sweden, and West Germany. These three countries have unusually strong, well-financed and well-accepted national agencies, and no doubt other European countries will follow suit when their national agencies become stronger.

There appear to have been considerations which, in all three countries, lie behind this move toward more active programing of research. First many major problems now require a multidisciplinary approach, and the agency must provide the inducement and opportunity for coordination of efforts of diverse experts in these fields. This is especially true in clinical research in Europe, which often is far out of contact with developments in basic sciences. A second purpose is to give the scientific community a greater sense of participation in the agency, and to have them share the responsibility for its effectiveness. As a German science administrator put it, "Now that society is putting a great deal of money at the disposal of the scientists, they have a new responsibility in society and we're trying to get them used to the idea."

In the Netherlands, the governmental basic-research agency, ZWO has formed a special organization for research planning involving both clinical and basic medical research. It is called FUNGO, acronymic in the Dutch language for Organization for Fundamental Medical Research, probably the first time in any country that medical research has been officially recognized as sometimes fundamental, no mean progress in itself. The Committee is headed by Prof. J. H. P. Jouxis, Chairman of Pediatrics at the University of Groningen and an NIH grantee in hemoglobin research.

The first achievement of the committee has been in persuading ZWO to create research planning groups in fields of importance, where several clinical and basic research interests intersect. "Groups" of from 6 to 10 members are being created on such topics as human genetics, human protein synthesis, human development, human cardiovascular research, and human steroid metabolism. While the groups have a "human" orientation, often more than half of their membership comes from nonclinical fields. Each "group" gets a small annual budget (separate from the research grants of the individual members) for coordinative projects and for arranging small meetings or symposia. Its membership is self-determined, but it is expected that any Dutch scientist interested in participating may become a member, once screened for competence and relevance by the parent organization, FUNGO. If the FUNGO experiment works in the biomedical field, it is expected that ZWO will set up similar organizations in other fields of science and scholarship.

The Swedish Medical Research Council has embarked on a somewhat similar program. It too has selected certain fields of research where interest and competence in Sweden is high and where several research disciplines may interact. For example, a group is now being formed in CNS pharmacodynamics to include certain neurochemists, psychopharmacologists, experimental psychologists, etc. Another one brings together cardiac, neuro, and vascular physiologists on the problem of the neurocontrol of the circulation. Human genetics, cancer cellular biology and immunochemistry are other subjects about which such groups are being formed. The planning is still early; while the groups will probably not have budgets of their own, except for their administrative expenses, their recommendations are expected to receive high priority from the MRC.

Western Germany has had for several years target programs (Schwerpunktprogramme) sponsored and financed by the German Research Association (Deutsche Forschungsgemeinschaft). These represent annual allotments of funds for areas of special importance in German research guided by ad hoc committees of consultants whose authority does not extend beyond the review of applications and projects in the target field. This left a gap as far as long-range planning or coordinative efforts were concerned in German research. As

a result "commissions" of experts were appointed in a number of fields to survey resources, needs and opportunities, and from their recommendations a new, additional mechanism for research programing has emerged in Germany this past year.

These "commissions" are the research units, patterned after British "units" (and closely resembling the Swedish and Dutch efforts). A "unit" consists of a carefully selected group of scientists, usually of different research intent, who are joined to pool their efforts in close coordination on a particular problem. While, in England, participating laboratories may actually be housed in a single institute, it is not expected that this will happen in Germany. They are charged not only with devoting major parts of their research efforts to the common goal, but also with providing the German Research Association with periodic appraisals of developments and sponsoring colloquia and meetings to further the work in their field. A "unit" is assured of 5 years' financial support to permit long-term scientific planning. So far, "units" of interest to NIH have been developed in (1) medical virology, (2) microbiology and nutrition, (3) physical basis of memory, (4) primatology, (5) plant and animal enzymology and (6) immunochemistry. Others are in planning stages.

The new program-oriented bodies in European research reflect the rapidly growing organization and financial strength of the national science agencies overseas. This led to stronger concepts of "national effort" and a need to coordinate and conserve that effort.

To what extent this growing overall strength may be attributable to the support and stimulation of research by NIH and the fiscal adjustments in Europe during the past 2 years is not discernible to any precise degree. However, the pattern of support of health-related research in a number of specific countries has been significantly affected by the restriction imposed upon NIH as a result of the U.S. international balance of payments deficit.

Actual NIH expenditure on support of foreign research in fiscal year 1965 fell more than a million dollars short of the amount permitted under the ceilings established by the Bureau of the Budget. The unexpectedly great reduction in overseas support by NIH appears to have been due mainly to two factors. First, there occurred concomitantly a considerable increase in the number of domestic applications which compromised the available funds of several Institutes. Second, the news, often exaggerated, that NIH's overseas program, in concert with those of other government agencies, would be reduced by about 15 percent by the new "ceiling," resulted in a nearly 50 percent reduction in applications from overseas.

The magnitude of the fall in NIH overseas support varied from country to country because the original "ceilings" were imposed regionally. The greatest retrenchments occurred in European countries. In terms of present reduction from 1964 support, Denmark's was the greatest (down 45 percent); then came Italy and Great Britain (down 28 percent), followed by Austria, France, Norway, and Sweden (off 25 percent). On the other hand Greece, Iceland, Spain, and Yugoslavia received increased NIH support. Canada's support fell 28 percent. South America, Near East, Far East, and Africa had only slight falls in NIH support.

So far, only the applicants rejected as a result of the more stringent application of the so-called foreign criteria fully feel the effect of NIH's reduction. Their reaction is one of disappointment and often discouragement, but NIH has encountered no bitterness or resentment. The European scientist feels he has been lucky to have had the outside support and he knew it "couldn't last forever." Most of them blame their own governments for continuing to countenance inadequate support of research, and they view NIH's support overseas as a remarkable example of U.S. generosity and farsightedness. (All overseas offices have consistently found that foreign scientists view NIH support as generosity when in fact NIH is constrained to insist on a return from its investment.) In most minds the drop off in scientific exchange is a more serious aspect of the lack of foreign support than other factors and at least the maintenance of cooperative ventures in research should follow up on previous support and extend, possibly, to new areas of interest.

The reaction in science administrative circles has varied with the degree of organization of the national science structure. In Denmark, with a small research establishment and only now developing a governmental science advisory agency, the effect of the 45-percent reduction is especially severe. NIH grants to Danish scientists in 1964 amounted very nearly to as much as Denmark's

modest National Research Foundation itself provided in biomedicine. Thus the U.S. reduction cannot easily be absorbed by the Government, and there is little machinery for using the reduction to stimulate the Government toward greater support.

On the other hand, Sweden has developed one of Europe's strongest and most effective national science agencies. The Swedish Medical Research Council anticipated a fall in NIH support more than a year ago, when the first suggestion of what was in the offing appeared in Science. The MRC immediately developed close liaison with NIH, and mounted a legislative campaign in the Swedish Government, citing the magnitude of Swedish financial dependency upon NIH (\$1.3 million in 1964), in order to obtain greater support. The campaign was successful. The MRC received additional funds which will more than offset the decline in NIH support this year.

In Great Britain, likewise, the Medical Research Council received a nearly 20-percent boost (to about \$25 million) which will relatively easily absorb the \$460,000 fall in NIH support. In Germany, NIH support has never been as large as in other advanced countries, and the German Research Association can easily take care of the 10-percent reduction.

The impact in France is difficult to appraise. France's agency for biomedical research was reorganized this past winter with new leadership. It is not yet in a position to exert legislative influence and its surveillance is not yet well enough developed to be aware of the role of NIH support. However, with an expected budget of about \$12 million for 1965, the reduction by \$160,000 in NIH support may not be severely felt.

The most lively reaction has been in Italy. The national research agency (Consiglio Nazionale delle Ricerche) is clumsily large, and in the view of many Italian scientists, is in very inadequate contact with the overall picture of biomedical research in Italy. In 1964, the NIH support in Italy was nearly half as large as CNR's own budget for biomedical research. While the CNR is not the sole source of research financing in Italy, the decline in NIH support of nearly \$150,000 this year may lead to an examination of the Government's responsibilities.

Last winter, when some of Italy's more prominent scientists found their U.S. support terminating, a small committee of prominent, independent Italian scientists was formed to warn the Government, over the head of the CNR, of the dangerous position in which Italian science might soon find itself. In February, a manifesto was prepared, signed by virtually all Italian biomedical scientists who receive support from U.S. agencies (67 in all) and sent to the Prime Minister and other governmental offices, as well as to the press. In addition to pointing out the magnitude of U.S. support of Italian science (from all agencies, in all branches of science, about \$1.1 million in 1964) and the lack of resources in CNR if this support should fall, it took the occasion to recommend quite sweeping changes in Italian science organization. Simultaneously, the committee addressed a letter to President Johnson (a copy of which appeared in Science) thanking the U.S. Government in behalf of all Italian scientists for past support. They pointed out the economic difficulties which sudden or severe reductions in that support would produce and requested that U.S. agencies with programs in Italy keep the CNR and individual grantees informed of any anticipated decline. In short, the public impact of U.S. reductions in Italy has been considerable.

It is too early to say what the long-term effect of the decline in U.S. support of health-related research in Europe will be. Study of the applications NIH has received during the past 12 months from Sweden indicate that the topflight, established scientists are tending to withdraw from competition for NIH grants. No doubt this is also happening in other economically secure countries. Such a regulation of this field to lesser talent, if significantly large, is of serious import to NIH which lays such stress on quality.

On the other hand, the possibility of NIH reductions has been used in several countries to bring about greater support from their own governments and a strengthening of their national science agencies.

The greatest anxiety expressed overseas is that limitations of U.S. support through the "ceilings" will attenuate contact with U.S. science. This is not only relevant to practicing scientists, but is especially a concern of national science administrators who look to NIH for leadership. Those with increased budgets, an interest in programing, and stronger organizations, as reported above, are more and more eager to work in concert with NIH in its fields of priority, whether or not NIH takes part financially. The opportunity thus presented to capitalize on new and positive developments in the foreign field should be of interest to NIH programers.

APPENDIX X.—*Bureau of the Budget statement relating to ceilings and targets for foreign research expenditures (March 8, 1966)*

Regarding the restrictions imposed by the Bureau, specific dollar ceilings on obligations for research project grants in selected countries have been given National Science Foundation and Public Health Service for 1964 through 1966. In the case of Defense, a "target" was given the agency to reduce research obligations by 50 percent of the 1963 level of \$5.6 million by 1966. A similar target was also given for exploratory development which provided for a reduction by 50 percent from the 1963 level of \$3.1 million by 1967.

APPENDIX XI.—*Excerpt from the National Science Foundation Act of 1950 relating to scholarships and graduate fellowships (Public Law 81-507, May 10, 1950; 42 U.S.C. 1869; 64 Stat. 152)*

SEC. 10. The Foundation is authorized to award, within the limits of funds made available specifically for such purpose pursuant to section 17, scholarships and graduate fellowships for scientific study or scientific work in the mathematical, physical, medical, biological, engineering, and other sciences at appropriate¹ nonprofit American or nonprofit foreign institutions selected by the recipient of such aid, for stated periods of time. Persons shall be selected for such scholarships and fellowships from among citizens or nationals² of the United States and such selections shall be made solely on the basis of ability; but in any case in which two or more applicants for scholarships or fellowships, as the case may be, are deemed by the Foundation to be possessed of substantially equal ability, and there are not sufficient scholarships or fellowships, as the case may be, available to grant one to each of such applicants, the available scholarship or scholarships or fellowship or fellowships shall be awarded to the applicants in such manner as will tend to result in wide distribution of scholarships and fellowships among the States, Territories, possessions, and the District of Columbia. Nothing contained in this Act shall prohibit the Foundation from refusing or revoking a scholarship or fellowship award, in whole or in part, in the case of any applicant or recipient, if the Board is of the opinion that such award is not in the best interests of the United States.³

APPENDIX XII.—*Department of State, Office of International Scientific Affairs, statement relating to U.S. agency scientific and technical representation overseas*

(This paper has been developed in collaboration with and approved by the International Committee of the Federal Council for Science and Technology, December 1964)

The Secretary of State, working through the various bureaus and offices of that Department, is the principal agent of the President in the execution of foreign policy and the conduct of foreign relations. Through its missions abroad, the Department of State is responsible for representing all of the interests of the United States. By delegation of authority from the President, the chief of mission at each post is responsible for the activities of all U.S. Government representatives in his area. In recent years there has been a steady increase of worldwide participation in the activities of science and of involvement of scientific and technological matters in international and diplomatic relations. Science has become a major concern to our embassies abroad.

In most embassies, matters related to international scientific affairs are handled on a part-time basis by nonspecialized diplomatic officers of the Foreign Service of the United States. At some posts, however, scientific activities have expanded so greatly and the involvement with the foreign scientific community has become so broad that the representation of U.S. interests in the field of science and technology requires the assignment of a scientific or technical special-

¹ The act of Sept. 8, 1959 (Public Law 86-232; 73 Stat. 467) substituted "appropriate" for "accredited" and deleted "of higher education" following "foreign institutions."

² The act of June 29, 1960 (Public Law 86-550; 74 Stat. 256) added "or nationals" after "citizens."

³ The act of Oct. 16, 1962 (Public Law 87-835; 76 Stat. 1069) added this last sentence of sec. 10.

ist who can devote full time and attention to these matters. These specialists are designated as science officers with appropriate diplomatic titles.

In addition, a number of U.S. agencies with scientific and technological interests have felt the need (1) to work abroad in close relationship to programs within their mission; (2) to associate with foreign scientists and engineers or institutions working in cooperation with the agency through grants and contracts; (3) to operate abroad when essential to the basic mission of the agency; and (4) to obtain more information about foreign scientific efforts which complement their mission. These responsibilities have been carried out by the assignment of agency representatives abroad with the concurrence of the Department of State. Such individuals assigned to an embassy normally will be a part of the scientific attaché's office.¹ This will provide better embassy organization and assure that they receive proper foreign policy direction and allow their participation in the objectives of the U.S. mission.

It is necessary to limit the number of people reporting directly to the Ambassador or his deputy. In the fields of science and technology, the scientific attaché shall serve as a designated channel from the Ambassador to provide foreign policy guidance to other scientific and technological representatives. The scientific attaché shall also function as the principal channel to the Ambassador for keeping him advised of U.S. scientific and technological interests and activities within the country. This shall not preclude direct access of other agency representatives to the chief of mission in special circumstances or at the chief of mission's desire. These arrangements are designed as facilitative, and not as supervisory, for the work of other agency representatives.

For the scientific attaché to be an effective channel to the chief of mission on science matters, other agency representatives should keep him informed of their activities and the interests of their agencies. The scientific attaché will in turn keep other agency representatives informed of his activities and interests and pertinent foreign policy considerations. Procedures to accomplish this objective are best worked out in each individual case between the scientific attaché and the agency representative. The attaché and the other agency representatives working as a science team can make a maximum contribution to the mission of the post and to the objectives of U.S. science.

When agency representatives have regional responsibilities appropriate relationships will be established with the embassies involved.

It is hoped that other agency representatives would assist the embassy, as time permits, with those scientific and technological activities which serve the international objectives of the United States and which are related to their individual technical competence.

APPENDIX XIII.—*Department of State, Office of International Scientific Affairs, letter relating to the U.S. regional science office in Rio de Janeiro, Brazil (February 23, 1966)*

Mrs. EDNA GASS,
Staff Administrator, Research and Technical Programs Subcommittee,
Committee on Government Operations,
House of Representatives.

DEAR MRS. GASS: Mr. Pollack has asked me to supply the information requested in your letter of February 11, 1966, relative to the U.S. regional science office in Rio de Janeiro, Brazil.

1. *The number of employees, their responsibilities, and the number of agencies participating in the program*

During the period 1962-64, the Army, Air Force, National Science Foundation (NSF), National Institutes of Health (NIH), and the Department of State participated in the regional science office. The NSF withdrew from Rio de

¹ This arrangement pertains to those representatives who are serving abroad in a scientific-administrative capacity as agent for their agency within a particular country or region. It does not pertain to those other agency employees who are working members of specialized scientific research programs overseas which are not administratively attached to an embassy.

Janeiro in 1964. A tabulation of personnel is indicated below for the period 1962-64 and from 1964 to the present time.

	United States	Local		United States	Local
During period 1962-64:			Current:		
State.....	2	-----	State.....	2	-----
Army.....	2	3	AID.....	1	-----
Air Force.....	1	3	Army.....	3	3
NSF.....	3	1	Air Force.....	2	3
NIH.....	4	2	NIH.....	3	2
Total.....	12	9	Total.....	11	8

The representatives of those technical agencies participating in the regional science office carry out on-the-scene appraisal of the programs of their respective agencies in South America. Through visits to scientific institutions and laboratories they are able to assess the scientific capabilities and resources available in this area which might be developed to the mutual benefit of foreign institutions and their individual agencies. They represent their agencies with respect to active, pending, or planned research projects in South America; participate in assessing the content of scientific meetings; and in some instances help to sponsor meetings of particular interest and significance to their own agency. The Department of State does not have a program of sponsored research. Its scientific attaché has, of course, other duties on behalf of the Embassy.

REGIONAL SCIENCE OFFICE, RIO

2. The budget for each of the years the office has been in operation and a description of how the cost is shared among the participating agencies

	Fiscal year 1963	Fiscal year 1964	Fiscal year 1965	Fiscal year 1966
Army.....	\$57,000	\$65,000	\$89,000	\$117,000
Air Force.....	31,370	49,752	60,820	76,576
NSF.....	50,664	58,622	-----	-----
NIH.....	92,180	104,516	97,260	100,000
State.....	29,400	29,840	36,960	38,022
AID.....	-----	-----	-----	18,395
Total.....	260,614	307,730	284,040	349,993

In the case of the State Department, the above costs are budgeted costs and do not always represent actual obligations. To obtain exact amounts of expenses during these past fiscal years would require correspondence with the office in Rio and these could not be supplied in time to respond to the committee's request.

The present cost of leasing and maintaining the office space is now divided on the basis of 70 percent Department of Defense and 30 percent National Institutes of Health. The lease on this space will expire in May of this year. At that time, it is planned that the office will be moved into the Embassy Building.

3. The reasons for the establishment of the consolidated office

In late 1961 both the Department of Defense (DOD) and the National Institutes of Health (NIH) expressed interest in establishing a science office in Latin America. Dr. Walter Whitman, who at that time was the science adviser to the Secretary of State, proposed that an integrated Regional Science Office be established under one roof, where scientists from participating U.S. agencies could be mutually supporting. This would be associated with the Office of the State Department's Scientific Attaché which had been established in 1958. The office was thus established as a combined office, with the added participation of NSF.

4. Have the responsibilities of the office expanded, contracted, or in any way changed since it was established?

As originally proposed, the Latin American Regional Science Office was authorized to deal with all Latin American countries. It is now, however, limited to South American countries. In addition, as indicated in paragraph 3, the NSF no longer participates in the Regional Office.

5. To what extent have budget or other economies been achieved by its establishment?

Because the Regional Science Office in Rio has always been on a consolidated basis, exact comparative costs with hypothetical separate offices cannot be determined. However, some general assumptions can be made.

Lease costs for one office are usually less expensive than separate leases for separate offices to house each individual agency. Administrative support furnished by the Embassy to a consolidated office is easier to handle and less expensive than to separate offices.

Additional savings are accomplished through the shared cost of services such as communications, fiscal services, pouch facilities, and security arrangements.

Consolidated offices also insure more complete coverage of all science activities. The absence of one agency representative can be covered on an interim basis by the presence of the remaining members of the office. Separate offices would probably require additional personnel to insure that full coverage is provided during absences of officials on duty travel or leave.

Possible duplication of efforts by the different agencies is eliminated and full communication on the various scientific programs is made available to the Ambassador through the consolidated arrangement.

6. Do representatives of the various agencies assigned to the office include men trained in different scientific disciplines?

As shown in the following tabulation, the professional staff has from the very establishment of the office included scientists of complementary scientific disciplines.

Department of State:

July 1962 to present, Dr. Andre C. Simonpietri, earth sciences.

Department of the Air Force:

July 1962 to present, Lt. Col. Charles Lyness, electronics.

March 1963 to present, Maj. Arthur Berthold, biochemistry.

Department of the Army:

August 1962 to present, Col. Leonard Orman, electrical engineering.

September 1962 to October 1964, Mr. Harold Weiler, biomedicine.

June 1964 to present, Dr. Francis Morthland, physical organic chemistry.

National Science Foundation (closed Rio office in July 1964):

August 1962 to July 1964, Dr. Harlow Mills, entomology.

August 1962 to July 1964, Dr. Max Hellman, organic chemistry.

National Institutes of Health:

October 1962 to October 1964, Dr. Dieter Koch-Weser, experimental pathology.

February 1964 to present, Dr. Alfred S. Lazarns, microbiology.

July 1962 to June 1964, Dr. Herbert Dalmat, parasitology.

July 1964 to present, Dr. Robert Akers, physiology.

7. Has the establishment of this office resulted in improved U.S. relations with the Latin American scientific community?

There can be little doubt that the Regional Science Office has become a focal point for the professional interests of both local scientists and their American counterparts. The office has provided a centralized channel for consideration of research grants, has given assistance in arranging scientific symposia and conferences, and has assured appropriate and effective review of U.S. participation in Latin American projects. In addition, the quantity and especially the quality of information now available on Latin American scientists and scientific institutions has been significantly augmented by the existence of this office.

8. *Has the Department taken steps to establish similar offices in other areas of the world?*

The Department has planned and is in the process of implementing comparable measures of coordination at other embassies in Europe, Asia, and the Far East.

Sincerely yours,

J. W. JOYCE,
Acting Deputy Director.

APPENDIX XIV.—*Memorandum from the President for Cabinet officers and heads of major agencies relating to dollar expenditures abroad (March 8, 1966)*

Our balance of payments requires our continuing attention and concern. We achieved a substantial improvement in the overall deficit in 1965 and we look forward to further improvement this year.

Federal overseas transactions play an important role in our balance of payments, and for the past several years we have made a great effort to minimize the adverse impact that our Federal programs might have on our balance of payments. But the requirements associated with Vietnam, both for military and for economic assistance, now demand even greater vigilance in controlling our overseas Federal transactions.

Under the procedures which have been established to control the balance-of-payments impact of the Federal Government's overseas activities, you are scheduled to report by March 15 to the Bureau of the Budget on your agency's international transactions. I urge that you use this occasion to reexamine all of your overseas programs with the utmost care. Your objective should be to maximize receipts and to minimize expenditures abroad consistent with the achievement of U.S. objectives.

I have instructed the Director of the Bureau of the Budget to examine your reports carefully and to inform me promptly of the progress which is being made by each Federal agency in assisting the Nation to achieve equilibrium in its balance of payments.

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